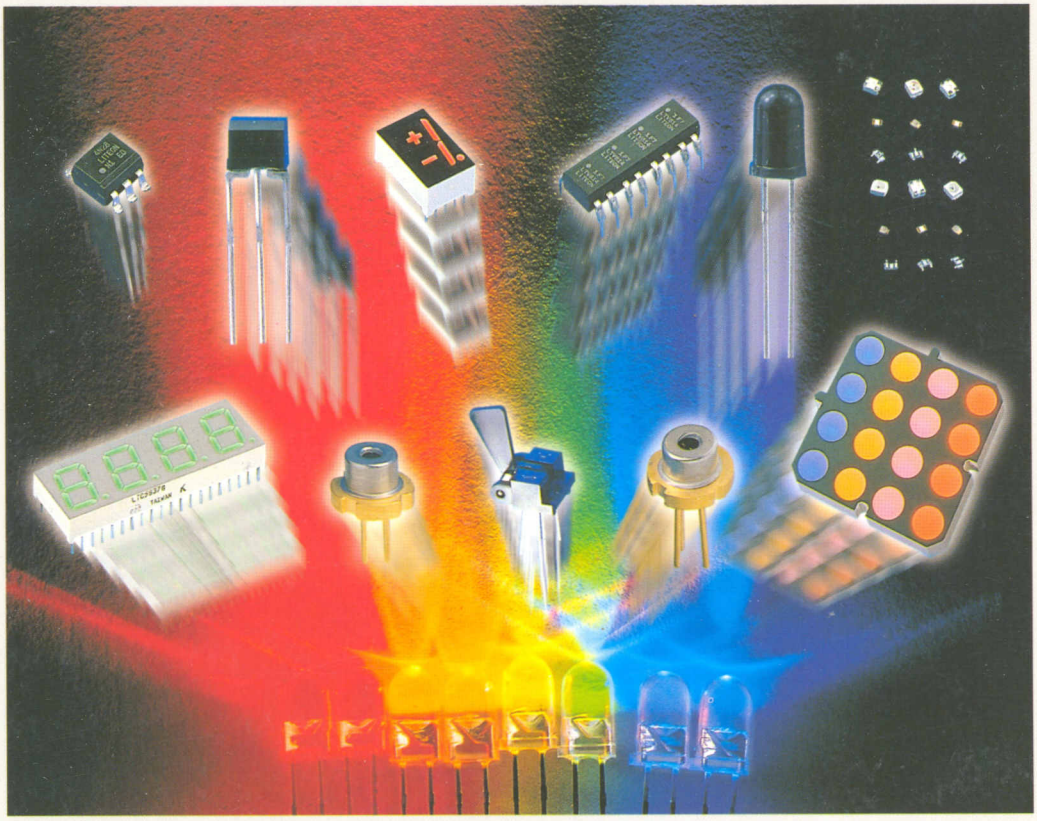
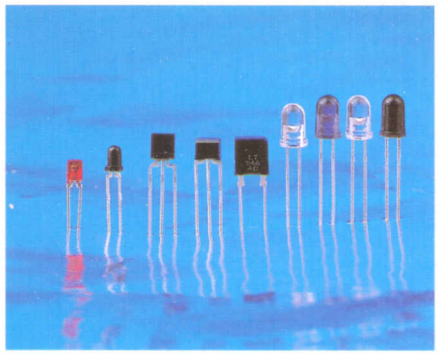
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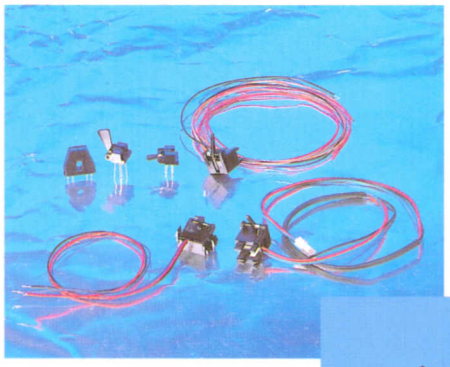


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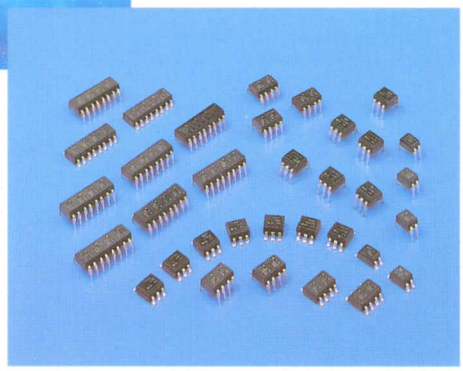
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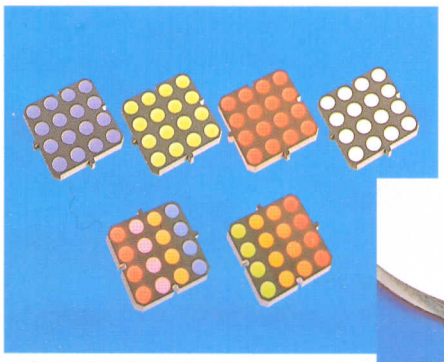
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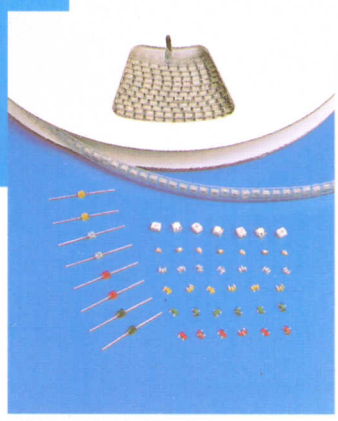
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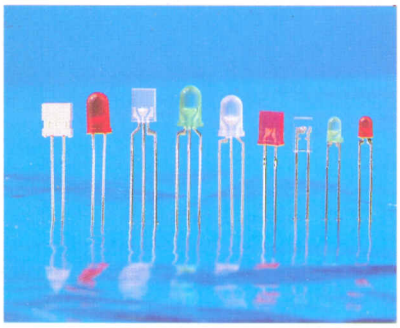
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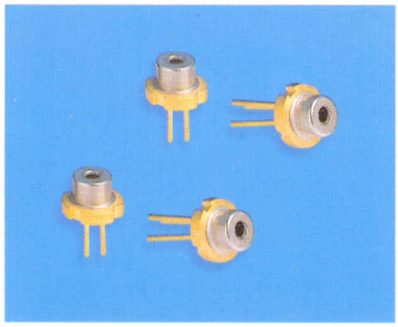
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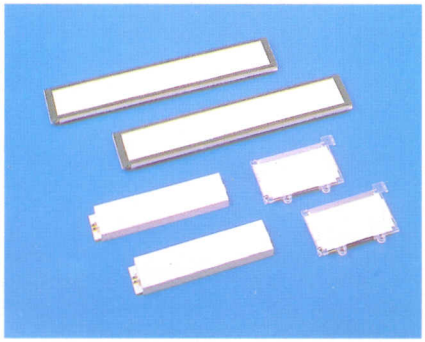
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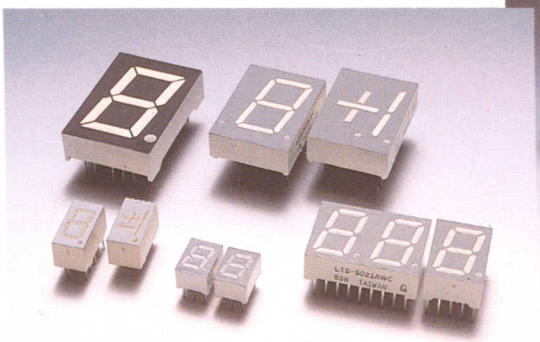


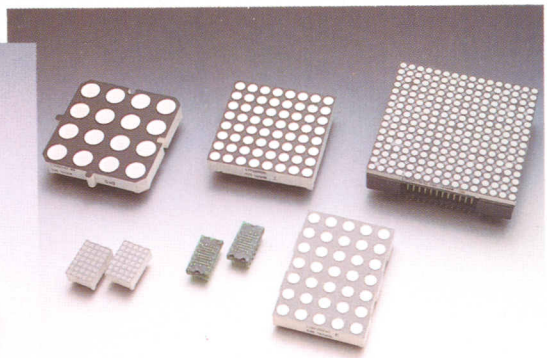
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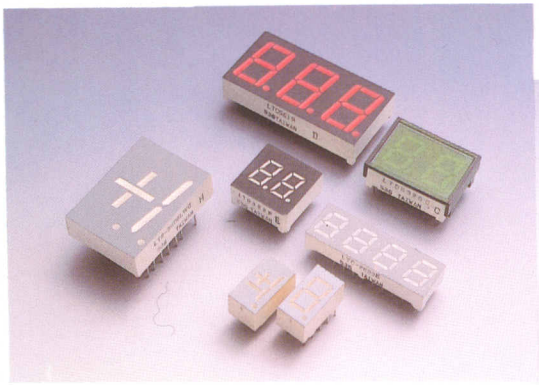
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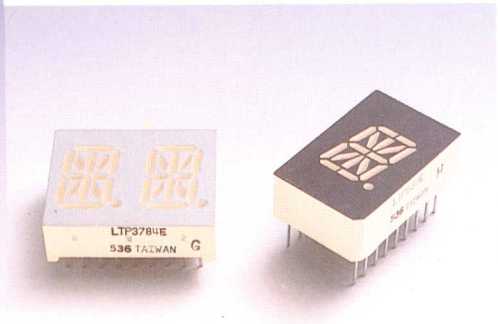
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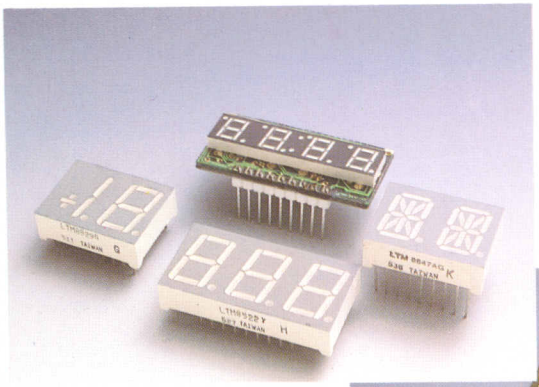
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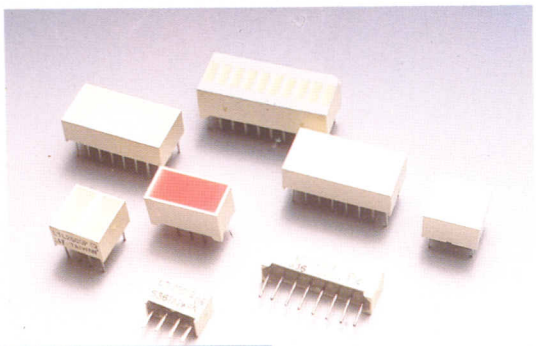




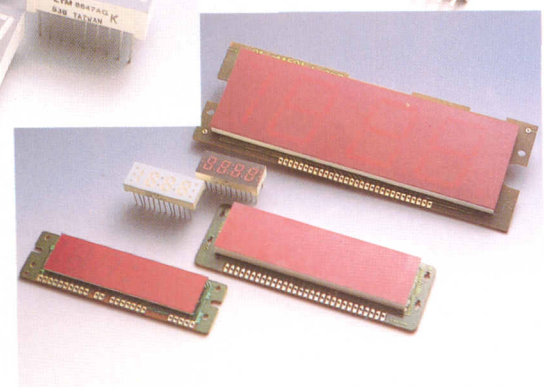
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SEVEN-SEGMENT LED DISPLAYS





LED DISPLAYS WITH DRIVER IC BUILT-IN



LED LIGHT BARS & BAR GRAPH ARRAYS

CLOCK LED DISPLAYS

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1. QUALITY & RELIABILITY

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LITEON Quality & Reliability

1.Introduction

One of the most important factors in any business is quality. Product quality is a key factor in gaining and holding market share. Our basic corporate philosophy is to provide high quality products at the best prices, an ideal which requires the careful management of quality control at all levels. OPTO manufacturers that have aggressive quality improvement programs will be the predominant suppliers in the future; those which do not probably will not survive.

At LITON our quality objective is not to just be competitive, but to be recognized as the worldwide leader in quality and reliability of OPTO products. To achieve this goal, we implemented the quality system of IECQ / ISO 9000 in 1991 and got the IECQ factory approval and ISO 9002 certificate in 1993 and ISO 9001 certificate in 1994. And all LITON employees in each organizations must understand what is required of them in their job for quality and reliability leadership, and they must be dedicated to conforming to those requirements.

2.Quality Policy

The LITON corporate quality policy is shown as below.

2.1 For every product we produce, we shall define requirements that meet or exceed our customers' specifications, and we shall conform to those requirements without exception.

2.2 We shall supply customers competitive products on time with zero defects.

2.3 Establish an attitude of defect prevention, and adhere to the principle of "do it right the first time" in pursuit of making high quality become part of our corporate life - style.

3. Reliability

3.1 The fundamental objective of LITON reliability program is to ensure that our products meet or exceed our customer's requirement. To achieve this goal the Reliability section constantly monitors products, This monitoring provides continuous updated measurement of product reliability in specific operating environments. The typical Reliability test items and conditions please refer to following page.

3.2 Purpose of reliability test. To specify suitable conditions obtainable in the laboratory and at device level which give test results equivalent to the actual service conditions existing in the field and to obtain reproducibility of the results of test.

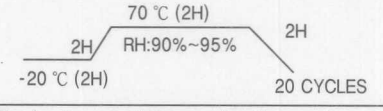
3.3 Functions

- New material quality evaluation
- Perform life and environmental tests to meet MIL-STD-883, MIL-STD-750, MIL-STD-202 and MIL-STD-19500.
- New product, process and package evaluation and qualification.
- Competitor's product evaluation.
- Customer special requirement.
- Long term reliability prediction.

Reliability Test for Infrared Products

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life	Evaluates resistance of the device when operated at electrical stress Ta=under room temperature Ip=160mA / 1/8Duty Pulse Width=1.25ms Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature High Humidity	Evaluates moisture resistance of the device when stored for a long term at high temperature and high humidity Ta=65 ± 5℃ Rh=90 ~ 95% Rh Test Time=240hrs ± 2hrs	MIL-STD-202 : 103B JIS C 7021 : B-11
	High Temperature High Humidity Reverse Bias	Evaluates resistance of leakage current against long term thermal,humidity,and electrical stresses Ta=65 ± 5℃ Rh=90 ~ 95% Rh Vr=5V Test Time=500hrs(-24hrs,+48hrs)	
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=105 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-55 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	JIS C 7021 : B-12
Environmental Test	Temperature Cycling	Evaluates resistance of device at thermal stresses or expansion and contraction 105℃ ~ 25℃ ~ -55℃ ~ 25℃ 30min 5min 30min 5min 10 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1010 JIS C 7021 : A-4
	Thermal Shock	Evaluates device's structure and mechanical resistance when suddenly exposed at severe changes 105±5℃ ~ -55±5℃ 10min 10min 10 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1011
	Solder Resistance	Evaluates resistance to thermal stress caused by soldering T.Sol=260 ± 5℃ Dwell Time =10 ± 1 Sec.	MIL-STD-202 : 210A MIL-STD-750 : 2031 JIS C 7021 : A-1
	Solderability	Evaluates solderability on leads of device T.Sol=230 ± 5℃ Dwell Time=5 ± 1Sec	MIL-STD-202 : 208D MIL-STD-750 : 2026 MIL-STD-883 : 2003 JIS C 7021 : A-2

Reliability Test for Photocouplers

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life	Evaluates resistance of the device when operated at electrical stress Ta=under room temperature IR:If=50mA ~ 80mA PTR:Pc=150mW ~ 300mW Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature High Humidity Storage	Evaluates moisture resistance of the device when stored for a long term at high temperature and high humidity Ta=65 ± 5℃ Rh=90 ~ 95% Rh Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-202 : 103B JIS C 7021 : B-11
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=125 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-55 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	JIS C 7021 : B-12
Environmental Test	Temperature Cycling	Evaluates resistance of device at thermal stresses or expansion and contraction 125℃ ~ 25℃ ~ -55℃ ~ 25℃ 30min 5min 30min 5min 20 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1010 JIS C 7021 : A-4
	Thermal Shock	Evaluates device's structure and mechanical resistance when suddenly exposed at severe changes 100±5℃ ~ 0±5℃ 5min 5min 20 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1011
	Moisture Resistance	Evaluates resistance of the device when exposed at high temperature and humidity conditions 	MIL-STD-202 : 106E MIL-STD-883 : 1004 JIS C 7021 : A-5
	Solder Resistance	Evaluates resistance to thermal stress caused by soldering T.Sol=260 ± 5℃ Dwell Time=10 ± 1 sec.	MIL-STD-202 : 210A MIL-STD-750 : 2031 JIS C 7021 : A-1
	Solderability	Evaluates solderability on leads of device T.Sol=230 ±5 ℃ Dwell Time=5 ± 1 sec	MIL-STD-202 : 208D MIL-STD-750 : 2026 MIL-STD-883 : 2003 JIS C 7021 : A-2

Reliability Test for Optic Receiver Modules

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life (High Temperature)	Evaluates resistance of the device against long term thermal and electrical Ta=65 ± 5℃ Vcc=5V Test Time=240hrs ± 2hrs	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature High Humidity Storage	Evaluates moisture resistance of the device when stored for a long term at high temperature and humidity Ta=40 ± 5℃ Rh=90 ~ 95% Rh Test Time=240hrs ± 2hrs	MIL-STD-202 : 103B JIS C 7021 : B-11
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=65 ± 5℃ Test Time=240hrs ± 2hrs	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-35 ± 5℃ Test Time=240hrs ± 2hrs	JIS C 7021 : B-12
Environmental Test	Temperature Cycling	Evaluates resistance of device at thermal stresses or expansion and contraction 70℃ ~ 25℃ ~ -20℃ ~ 25℃ 30min 5min 30min 5min 20 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1010 JIS C 7021 : A-4
	Vibration	Evaluates resistance of the device when incurred at trans - portation 10 ~ 55Hz/Sweep / 1min 1.5mm X.Y.Z / 15min	MIL-STD-202 : 201A JIS C 7021 : A-10

Reliability Test for LCD Back Lights

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life	Evaluates resistance of the device when operated at electrical stress Ta=under room temperature If=as per data sheet maximum rating Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature High Humidity Storage	Evaluates moisture resistance of the device when stored for a long term at high temperature and humidity Ta=65 ± 5℃ Rh=90~95% Rh TEST TIME=240hrs(-24hrs,+72hrs)	MIL-STD-202 : 103B JIS C 7021 : B-11
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=85 ± 5℃ TEST TIME=1000hrs(-24hrs,+72hrs)	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-35 ± 5℃ TEST TIME=1000hrs(-24hrs,+72hrs)	JIS C 7021 : B-12
Environmental Test	Thermal Shock	Evaluates device's structure and mechanical resistance when suddenly exposed severe changes 85 ± 5℃ ~ -35 ± 5℃ 30min 30min 20 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1011

Reliability Test for Light Sources

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life	Evaluates resistance of the device when operated at electrical stress Ta=under room temperature Vcc=as per data sheet maximum rating 30sec. On / 30sec. Off Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature Life Test	Evaluates resisance of the again long term thermal and electrical stresses Ta=55 ± 5℃(35 ± 5℃ for handy scanner) Vcc=as per data sheet maximum Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature High Humidity Storage	Evaluates moisture resistance of the device when stored for a long term at high temperature and humidity Ta=65 ± 5℃(55 ± 5℃ for handy scanner) Rh=90 ~ 95% Rh Test Time=240hrs(-24hrs,+48hrs)	MIL-STD-202 : 103B JIS C 7021 : B-11
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=65 ± 5℃(55 ± 5℃ for handy scanner) Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-25 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	JIS C 7021 : B-12
Environmental Test	Thermal Shock	Evaluates device's structure and mechanical resistance when suddenly exposed at severe changes 65 ± 5℃ ~ -25 ± 5℃ (55 ± 5℃ ~ -25 ± 5℃ for handy scanner) 30min 30min 20 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1011

Reliability Test for LED Lamps

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life	Evaluates resistance of the device when operated at electrical stress Ta=under room temperature Ip=160mA / 1/8duty Pulse Width=1.25ms Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature High Humidity Storage	Evaluates moisture resistance of the device when stored for a long term at high temperature and high humidity Ta=65 ± 5℃ Rh=90 ~ 95% Rh Test Time=240hrs ± 2hrs	MIL-STD-202 : 103B JIS C 7021 : B-11
	High Temperature High Humidity Reverse Bias	Evaluates resistance of leakage current against long term thermal,humidity,and electrical stresses Ta=65 ± 5℃ Rh=90 ~ 95% Rh Vr=5V Test Time=500hrs(-24hrs,+48hrs)	
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=105 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-55 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	JIS C 7021 : B-12
Environmental Test	Temperature Cycling	Evaluates resistance of device at thermal stresses or expansion and contraction 105℃ ~ 25℃ ~ -55℃ ~ 25℃ 30min 5min 30min 5min 10 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1010 JIS C 7021 : A-4
	Thermal Shock	Evaluates device's structure and mechanical resistance when suddenly exposed at severe changes 105 ± 5℃ ~ -55 ± 5℃ 10min 10min 10 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1011
	Solder Resistance	Evaluates resistance to thermal stress caused by soldering T.Sol=260 ± 5℃ Dwell Time=10 ± 1 sec.	MIL-STD-202 : 210A MIL-STD-750 : 2031 JIS C 7021 : A-1
	Solderability	Evaluates solderability on leads of device T.Sol=230 ±5 ℃ Dwell Time=5 ± 1 sec.	MIL-STD-202 : 208D MIL-STD-750 : 2026 MIL-STD-883 : 2003 JIS C 7021 : A-2

Reliability Test for LED Displays

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life	Evaluates resistance of the device when operated at electrical stress Ta=under room temperature If=12mA ~ 25mA per segment or Ip=80mA/duty=1/8,PW=1.25ms Ip=160mA/duty=1/16,PW=1ms(DOT) Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature High Humidity Storage	Evaluates moisture resistance of the device when stored for a long term at high temperature and humidity Ta=65 ± 5℃ Rh=90 ~ 95% Rh Test Time=240hrs ± 2hrs	MIL-STD-202 : 103B JIS C 7021 : B-11
	High Temperature High Humidity Reverse Bias	Evaluates resistance of leakage current against long term thermal,humidity,and electrical stresses Ta=65 ± 5℃ Rh=90 ~ 95% Rh Vr=5V Test Time=500hrs(-24hrs,+48hrs)	
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=85 ± 5℃(Cob:Ta=65 ± 5 ℃) Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-35 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	JIS C 7021 : B-12
Environmental Test	Temperature Cycling	Evaluates resistance of device at thermal stresses or expansion and contraction 85℃ ~ 25℃ ~ -35℃ ~ 25℃ 30min 5min 30min 5min 10 Cycles(Cob:Thot=65℃ Tcold=-25℃)	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1010 JIS C 7021 : A-4
	Thermal Shock	Evaluates device's structure and mechanical resistance when suddenly exposed at severe changes 85±5℃ ~ -35±5℃ 10min 10min 10 Cycles(Cob:Thot=65℃ Tcold=-25℃)	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1011
	Solder Resistance	Evaluates resistance to thermal stress caused by soldering T.Sol=260 ± 5℃ Dwell Time=10 ± 1 sec.	MIL-STD-202 : 210A MIL-STD-750 : 2031 JIS C 7021 : A-1
	Solderability	Evaluates solderability on leads of device T.Sol=230 ±5 ℃ Dwell Time=5 ± 1 sec	MIL-STD-202 : 208D MIL-STD-750 : 2026 MIL-STD-883 : 2003 JIS C 7021 : A-2

Reliability Test for Clock LED Displays

Classification	Test Item	Description and Test Condition	Reference Standard
Endurance Test	Operation Life	Evaluates resistance of the device when operated at electrical stress Ta=under room temperature If=20mA ~ 25mA per segment Test Time=1000hrs(-24hrs,+72hrs)	MIL-STD-750 : 1026 MIL-STD-883 : 1005 JIS C 7021 : B-1
	High Temperature Storage	Evaluates device durability for long term storage in high temperature Ta=65 ± 5℃ Test Tme=1000hrs(-24hrs,+72hrs)	MIL-STD-883 : 1008 JIS C 7021 : B-10
	Low Temperature Storage	Evaluates device durability for long term storage in low temperature Ta=-35 ± 5℃ Test Time=1000hrs(-24hrs,+72hrs)	JIS C 7021 : B-12
Environmental Test	Temperature Cycling	Evaluates resistance of device at thermal stresses or expansion and contraction 65℃ ~ 25℃ ~ -25℃ ~ 25℃ 30min 5min 30min 5min 10 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1010 JIS C 7021 : A-4
	Thermal Shock	Evaluates device's structure and mechanical resistance when suddenly exposed at severe changes 65 ± 5℃ ~ -25 ± 5℃ 10min 10min 10 Cycles	MIL-STD-202 : 107D MIL-STD-750 : 1051 MIL-STD-883 : 1011
	Solder Resistance	Evaluates resistance to thermal stress caused by soldering T.Sol=260 ± 5℃ Dwell Time=10 ± 1 Sec.	MIL-STD-202 : 210A MIL-STD-750 : 2031 JIS C 7021 : A-1
	Solderability	Evaluates solderability on leads of device T.Sol=230 ±5 ℃ Dwell Time=5 ± 1 Sec.	MIL-STD-202 : 208D MIL-STD-750 : 2026 MIL-STD-883 : 2003 JIS C 7021 : A-2

2. INFRARED PRODUCTS

- SELECTION GUIDE 2-1
- CROSS REFERENCE GUIDE 2-4
- INFRARED EMITTING DIODES 2-6
- PHOTOTRANSISTORS 2-30
- PHOTODIODES 2-48
- IR DETECTING UNIT FOR REMOTE CONTROL 2-56

Selection Guide

· Infrared Emitting Diodes

Outline	Device		Description		Aperture Radiant Incidance (Radiant Intensity) Ee Typ. (Ie Typ.) @20mA	Typical Viewing Angle $2\theta 1/2$*	V_F Typ. @ 20mA	Page No.
	Package	Part No.	Wave-Length λP	Lens				
	T-1 Modified 0.05" Pitch 0.5"Lead 3φ	LTE-209	940nm	Water Clear	0.4mW/cm² (3.0mW/sr)	16 °	1.2V	2-6
		LTE-209C	940nm	Smoke	0.4mW/cm² (3.0mW/sr)	16 °	1.2V	
	T-1 Standard 1"Lead 3φ	LTE-4206	940nm	Water Clear	0.7mW/cm² (5.26mW/sr)	20 °	1.2V	2-9
		LTE-4206C	940nm	Smoke	0.7mW/cm² (5.26mW/sr)	20 °	1.2V	
	T-1 Standard 1"Lead 3φ	LTE-4216	940nm	Water Clear	0.7mW/cm² (5.26mW/sr)	20 °	1.2V	2-9
		LTE-4216C	940nm	Smoke	0.7mW/cm² (5.26mW/sr)	20 °	1.2V	
	T-1 3/4 Narrow Viewing Angle 1"Lead 5φ	LTE-2871	940nm	Water Clear	1.6mW/cm² (12mW/sr)	16 °	1.2V	2-12
		LTE-2871C	940nm	Smoke	1.6mW/cm² (12mW/sr)	16 °	1.2V	
	T-1 3/4 Standard 1"Lead 5φ	LTE-3271T	940nm	Water Clear	1.4mW/cm² (10.5mW/sr)	50 °	** 1.25V	2-15
		LTE-3371T	940nm	Water Clear	1.6mW/cm² (12mW/sr)	40 °	** 1.25V	
		LTE-3271TL	940nm	Blue Transparant	1.4mW/cm² (10.5mW/sr)	50 °	** 1.25V	
		LTE-3371TL	940nm	Blue Transparant	1.6mW/cm² (12mW/sr)	40 °	** 1.25V	
	T-1 3/4 Standard 1"Lead 5φ	LTE-3376	850nm	Water Clear	8.0mW/cm² (45mW/sr)	30 °	**1.6V	2-18
	Side Look	LTE-302-M	940nm	Water Clear	–	40 °	1.2V	2-21
	Side Look	LTE-309	940nm	Water Clear	–	40 °	1.2V	

Notes: *2 $\theta 1/2$ is the off-axis angle at which the radiant intensity is half the axial radiant intensity.
**V_F Typ. @50mA

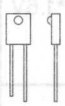
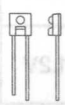
Selection Guide

· Infrared Emitting Diodes

Outline	Device		Description		Aperture Radiant Incidance (Radiant Intensity) Ee Typ. (Ie Typ.) @20mA	Typical Viewing Anele $2\theta 1/2$*	V_F Typ. @ 20mA	Page No.
	Package	Part No.	Wave-Length λP	Lens				
	Side Look	LTE-306	940nm	Water Clear	0.2mW/cm² (1.5mW/sr)	30 °	1.2V	2-24
	T-1 3/4 Standard 1"Lead 5φ	LTE-4238	880nm	Water Clear	1.4mW/cm² (10.5mW/sr)	20 °	1.3V	2-27
		LTE-4238C	880nm	Smoke	1.4mW/cm² (10.5mW/sr)	20 °	1.3V	
	T-1 3/4 Standard 1"Lead 5φ	LTE-5238A	880nm	Water Clear	1.0mW/cm² (7.5mW/sr)	40 °	1.3V	2-27
		LTE-5238AC	880nm	Smoke	1.0mW/cm² (7.5mW/sr)	40 °	1.3V	

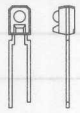
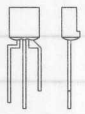
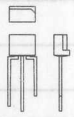
Notes:*$2\theta 1/2$ is the off-axis angle at which the radiant intensity is half the axial radiant intensity.

· Phototransistors

Outline	Device		Light Current Typ. @Ee=1 mW/cm²	Dark Current Max. @V_{CE}=10V	$V_{CE(SAT)}$ MAX @I_C=100μA	V_{CEO}MIN. @I_C=1mA	Page No.
	Package	Part No.					
	T-1 Modified 0.05"Pitch 0.5"Lead 3φ	LTR-209	4mA	100nA	0.4V	30V	2-30
		LTR-209C		100nA	0.4V	30V	
	T-1 Standard 1"Lead 3φ	LTR-4206	4mA	100nA	0.4V	30V	2-33
		LTR-4206E	2mA	100nA	0.4V	30V	
	T-1 3/4 Standard 0.5"Lead 5φ	LTR-3208	4mA	100nA	0.4V	30V	2-36
		LTR-3208E	2mA	100nA	0.4V	30V	
	Side Look (Water Clear)	LTR-301	1mA	100nA	0.4V	30V	2-39
	Side Look (Water Clear)	LTR-309	1mA	100nA	0.4V	30V	2-39

Selection Guide

· Phototransistors

Outline	Device		Light Current TYP. @Ee=1 mW/cm²	Dark Current MAX. @VCE=10V	VCE(SAT) MAT @IC=100μA	VceoMIN. @IC=1mA	Page No.
	Package	Part No.					
	Side Look (Red Clear)	LTR-306	1mA	100nA	0.4V	30V	2-42
	Side Look (Black Plastic)	LTR-5576D	0.4mA	100nA	0.4V	30V	2-45
		LTR-5986D					

· Photodiodes

Outline	Device		Is TYP. @Ee=0.1 mW/cm² Vcc=5V	ID(R) MAX. @VR=10V	V(BR)R MIN. @IR=100μA	Peak Sensitivity Wavelength λP TYP.	Page No.
	Package	Part No.					
	Side Look (Black Plastic)	LTR-516AB	2μA	30nA	30V	950mm	2-48
		LTR-516AD					2-52
		LTR-526AB					2-48
		LTR-526AD					2-52
		LTR-536AB					2-48
		LTR-536AD					2-52
		LTR-546AB					2-48
		LTR-546AD					2-52

Cross Reference Guide

HONEYWELL	LITON
Infrared Emitter	
SEP8505/8525	LET-209
SEP8506/8526	LTE-302-M
Photo Transistor	
SEP8405/8425	LTR-209
SEP8406/8426	LTR-301
SEP8403	LTR-3208

SIEMENS	LITON
Infrared Emitter	
IRL80A	LTE-302-M
LD274	LTE-2871
SFH409	LTE-4206
SFH414	LTE-4228U
SFH485	LTE-5238
SFH416	LTE-3271T
SFH415	LTE-3371T
Photo Transistor	
LPT80A	LTR-301
BP103	LTR-3208
PhotoDiode	
SFH205	LTR-516AD
SFH206	LTR-526AD

SHARP	LITON
Infrared Emitter	
GL480	LTE-306
GL360/380	LTE-4206
GL537	LTE-3270
GL527	LTE-3271T
GL538	LTE-3371T
GL528	LTE-3371T
Photo Transistor	
PT480	LTR-306
PT360/380	LTR-4206
PhotoDiode	
PD481PI	LTR-546AD

TELEFUNKEN	LITON
Infrared Emitter	
TSHA3400	LTE-4206
TSHA5200/6200	LTE-4228
TSHA5500/6500	LTE-3271T
Photo Transistor	
BPW42	LTR-4206
PhotoDiode	
BWP41/82	LTR-536AD
BWP75/84	LTR-546AD

Cross Reference Guide

OPTEK	LITON
Infrared Emitter	
OP265	LTE-209
OP140	LTE-302-M
OP266	LTE-4206
OP295	LTE-4238
OP296	LTE-4228
OP290	LTE-5238A
OP292	LTE-3271
OP298	LTE-3371
Photo Transistor	
OP550	LTR-209
OP550	LTR-301
OP565	LTR-4206
OP598	LTR-3208

TOSHIBA	LITON
Infrared Emitter	
TLN109	LTE-4206
TLN115	LTE-3271T
TLN205	LTE-3371T
Photo Transistor	
TLP615	LTR-4206

NEC	LITON
Photo Interrupter	
SE303	LTE-3271T
SE313	LTE-3371T
PhotoDiode	
PH302	LTR-546AD

KODENSHI	LTION
Infrared Emitter	
AL-1L2	LTE-3271T
Photo Transistor	
ST7L	LTR-209
ST23F	LTR-306
PhotoDiode	
SP12FS	LTR-526AD

LITEON

GaAlAs T-1 Modified 3 ϕ Infrared Emitting Diode

LTE-209/LTE-209C

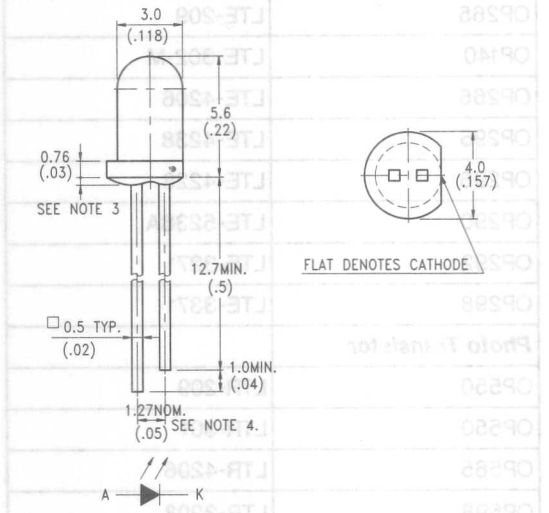
Features

- Selected to specific on-line intensity and radiant intensity ranges.
- Low cost plastic end looking package.
- Mechanically and spectrally matched to the LTR-209 series of phototransistor.
- The LTE-209 series are made with Gallium Aluminum Arsenide window layer on Gallium Arsenide infrared emitting diodes.

Description

The LTE-209 series are high intensity Gallium Aluminum Arsenide infrared emitting diodes mounted in clear plastic end looking packages. The LTE-209 series provides a broad range of intensity selection.
C-smoke color lens.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	90	mW
Peak Forward Current (300pps, 10 μ s pulse)	1	A
Continuous Forward Current	60	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
*Aperture Radiant Incidence	Ee	0.2	0.4		mW/cm^2	I_F=20mA
Radiant Intensity	Ie	1.5	3.0		mW/sr	I_F=20mA
Peak Emission Wavelength	λ Peak		940		nm	I_F=20mA
Spectral Line Half-Width	△ λ		50		nm	I_F=20mA
Forward Voltage	V_F		1.2	1.6	V	I_F=20mA
Reverse Current	I_R			100	μ A	V_R=5V
Viewing Angle (See Fig.6)	2 θ 1/2		16		deg	

Note: *Ee is a measurement of the average radiant incidence upon a sensing area $1cm^2$ in perpendicular to and centered on the mechanical axis of the lens and 26.8mm from lens.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

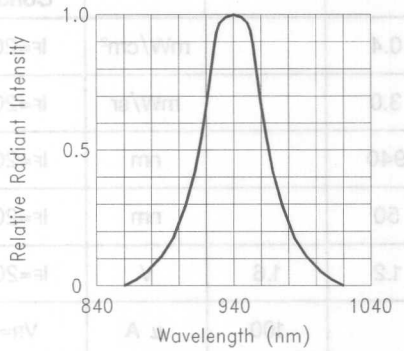


FIG.1 SPECTRAL DISTRIBUTION

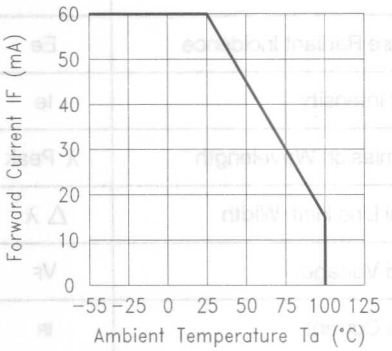


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

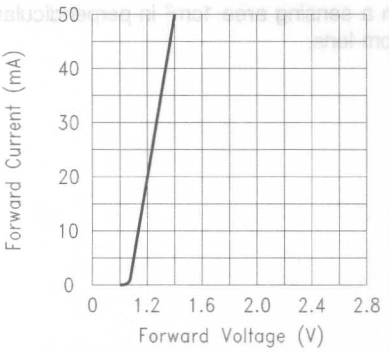


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

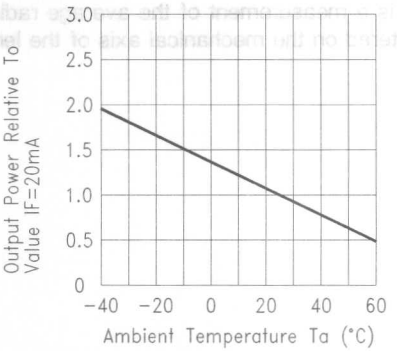


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

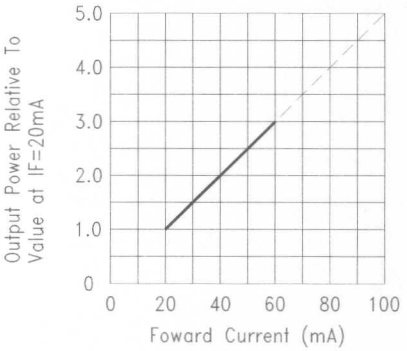


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

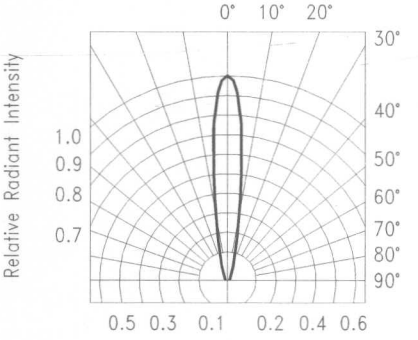


FIG.6 RADIATION DIAGRAM

GaAlAs T-1 Standard 3 ϕ Infrared Emitting Diode

LTE-4206/LTE-4206C/LTE-4216/LTE-4216C

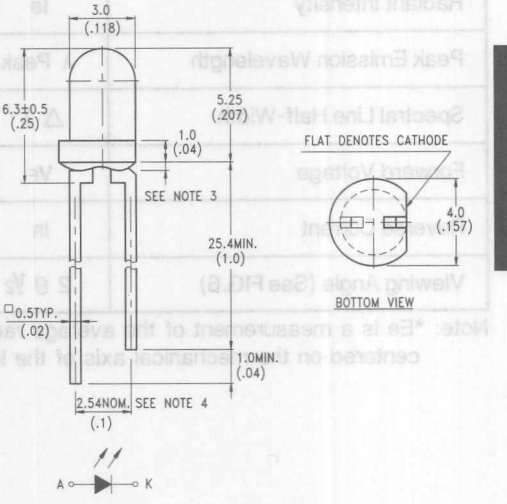
Features

- Selected to specific on-line intensity and radiant inten sity ranges.
- Low cost plastic end looking package.
- Mechanically and spectrally matched to the LTR-4206 series of phototransistor.
- The LTE-4206 series are made with Gallium Aluminum Arsenide window layer on Gallium Arsenide infrared emitting diodes.

Description

The LTE-4206 series are high intensity Gallium Aluminum Arsenide infrared emitting diodes mounted in clear plastic end looking packages. The LTE-4206 series provides a broad range of intensity selection. C-smoke color lens.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	90	mW
Peak Forward Current (300pps, 10 μ s pulse)	1	A
Continuous Forward Current	60	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
*Aperture Radiant Incidence	Ee	0.3	0.7		mW/cm^2	I_F=20mA
Radiant Intensity	Ie	2.25	5.26		mW/sr	I_F=20mA
Peak Emission Wavelength	λ Peak		940		nm	I_F=20mA
Spectral Line Half-Width	△ λ		50		nm	I_F=20mA
Forward Voltage	V_F		1.2	1.6	V	I_F=20mA
Reverse Current	I_R			100	μ A	V_R=5V
Viewing Angle (See FIG.6)	2 θ ½		20		deg	

Note: *Ee is a measurement of the average radiant incidence upon a sensing area $1cm^2$ in perpendicular to and centered on the mechanical axis of the lens and 26.8mm from lens.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

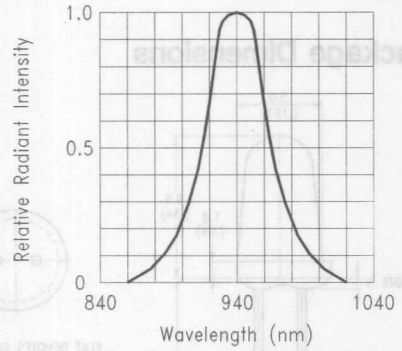


FIG.1 SPECTRAL DISTRIBUTION

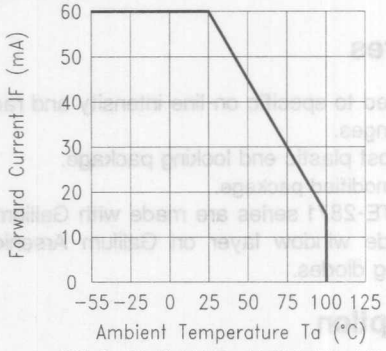


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

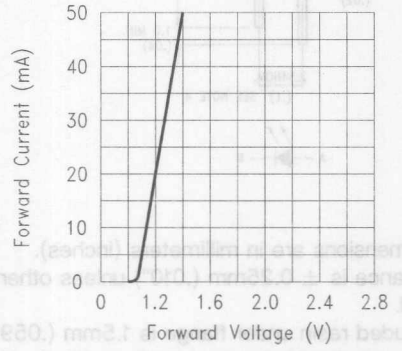


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

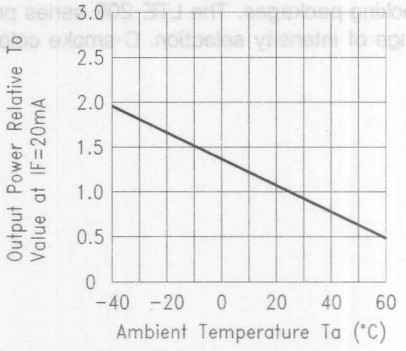


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

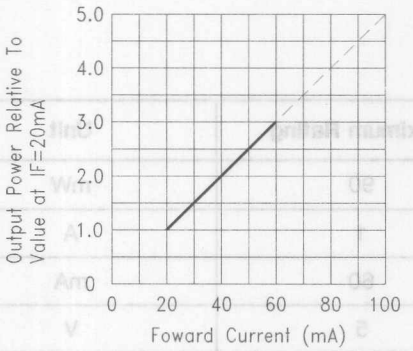


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

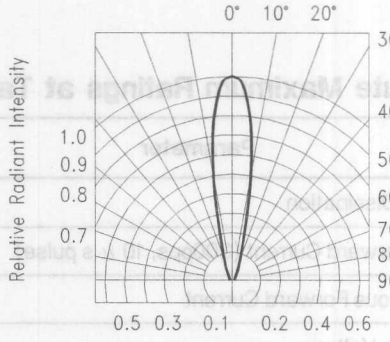


FIG.6 RADIATION DIAGRAM

LITEON

GaAlAs T-1¾ Modified 5 ϕ Infrared Emitting Diode

LTE-2871/LTE-2871C

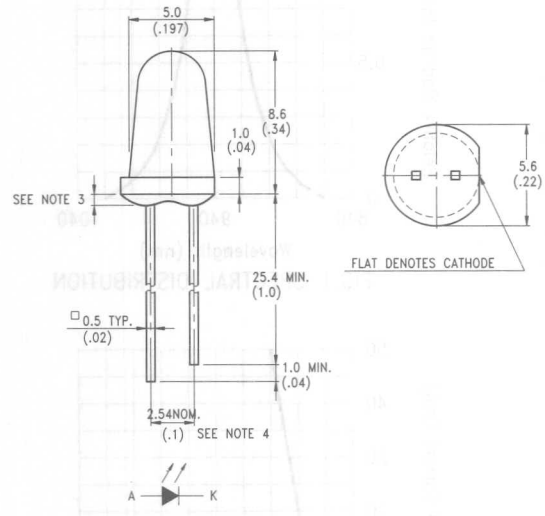
Features

- Selected to specific on-line intensity and radiant intensity ranges.
- Low cost plastic end looking package.
- T-1¾modified package.
- The LTE-2871 series are made with Gallium Aluminum Arsenide window layer on Gallium Arsenide infrared emitting diodes.

Description

The LTE-209 series are high intensity Gallium Aluminum Arsenide infrared emitting diodes mounted in clear plastic end looking packages. The LTE-209 series provides a broad range of intensity selection. C-smoke color lens.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	90	mW
Peak Forward Current (300pps, 10 μ s pulse)	1	A
Continuous Forward Current	60	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
*Aperture Radiant Incidence	Ee	0.7	1.6		mW/cm^2	I_F=20mA
Radiant Intensity	Ie	5.25	12		mW/sr	I_F=20mA
Peak Emission Wavelength	λ Peak		940		nm	I_F=20mA
Spectral Line Half-Width	Δ λ		50		nm	I_F=20mA
Forward Voltage	V_F		1.2	1.6	V	I_F=20mA
Reverse Current	I_R			100	μ A	V_R=5V
Viewing Angle (See FIG.6)	$2\theta_{1/2}$		16		deg	

Note: *Ee is a measurement of the average radiant incidence upon a sensing area $1cm^2$ in perpendicular to and centered on the mechanical axis of the lens and 26.8mm from lens.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

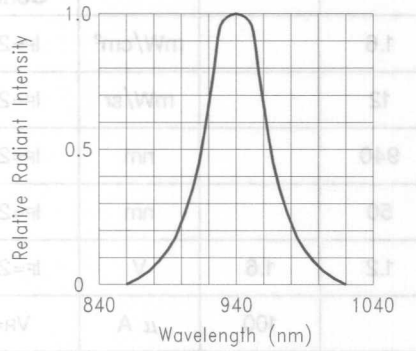


FIG.1 SPECTRAL DISTRIBUTION

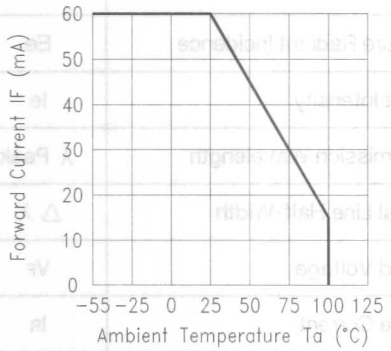


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

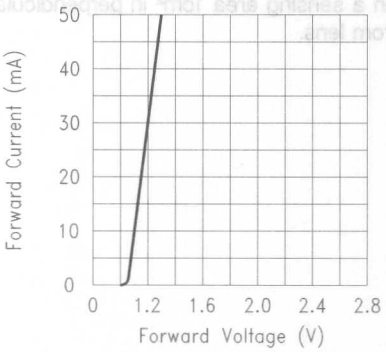


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

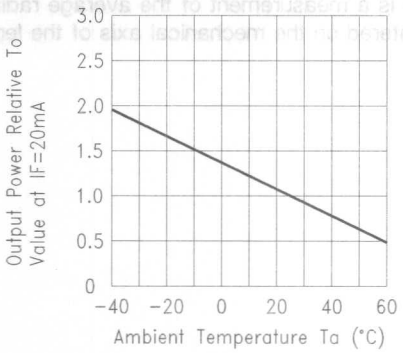


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

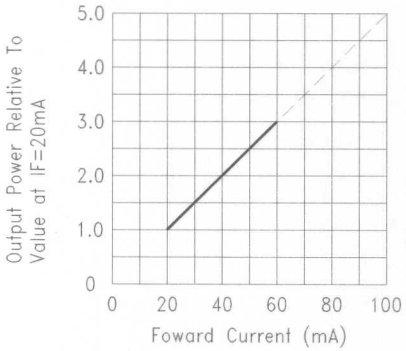


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

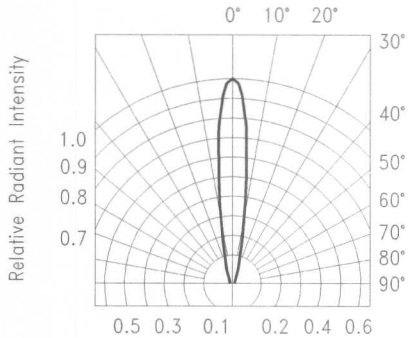


FIG.6 RADIATION DIAGRAM

LITEON

GaAlAs T-1¾ Standard 5 ϕ Infrared Emitting Diode

LTE-3271T/LTE-3371T/LTE-3271TL/LTE-3371TL

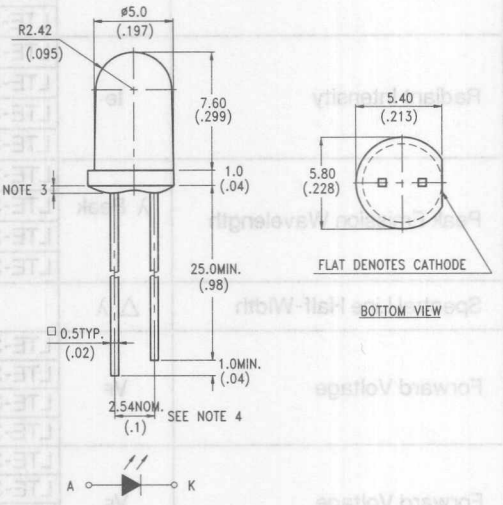
Features

- Special for high current and low forward voltage.
- High power.
- Available for pulse operating.
- Wide viewing angle.
- LTE-3271TL/LTE-3371TL are blue transparent color package.

Description

The LTE-3271T/LTE-3371T/LTE-3271TL/LTE-3371TL are high intensity Gallium Aluminum Arsenide infrared emitting diodes mounted in plastic end looking packages. They provide a broad range of intensity selection and are specified under pulsed drive up to 2 Amps.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	150	mW
Peak Forward Current (300pps, 10 μ s pulse)	2	A
Continuous Forward Current	100	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Part No.	Min.	Typ.	Max.	Unit	Test Condition
*Aperture Radiant Incidence	Ee	LTE-3271T	0.80	1.4		mW/cm²	IF=20mA
		LTE-3271TL					
		LTE-3371T	0.90	1.6			
		LTE-3371TL					
Radiant Intensity	Ie	LTE-3271T	6	10.5		mW/sr	IF=20mA
		LTE-3271TL					
		LTE-3371T	6.77	12			
		LTE-3371TL					
Peak Emission Wavelength	λ Peak	LTE-3271T		940		nm	IF=20mA
		LTE-3271TL					
		LTE-3371T					
		LTE-3371TL					
Spectral Line Half-Width	Δ λ			50		nm	IF=20mA
Forward Voltage	VF	LTE-3271T		1.25	1.6	V	IF=50mA
		LTE-3271TL					
		LTE-3371T					
		LTE-3371TL					
Forward Voltage	VF	LTE-3271T		1.65	2.1	V	IF=250mA
		LTE-3271TL					
		LTE-3371T					
		LTE-3371TL					
Reverse Current	IR				100	μ A	VR=5V
Viewing Angle (See FIG.6)	2 θ 1/2	LTE-3271T		50		deg	
		LTE-3271TL					
		LTE-3371T		40			
		LTE-3371TL					

Note: *Ee is a measurement of the average radiant incidence upon a sensing area 1cm² in perpendicular to and centered on the mechanical axis of the lens and 26.8mm from lens.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

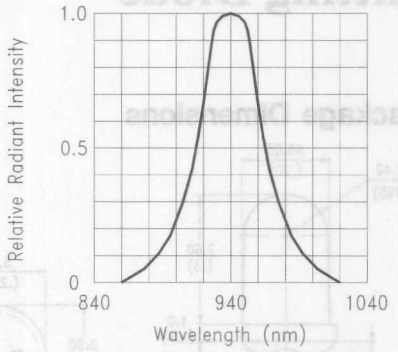


FIG.1 SPECTRAL DISTRIBUTION

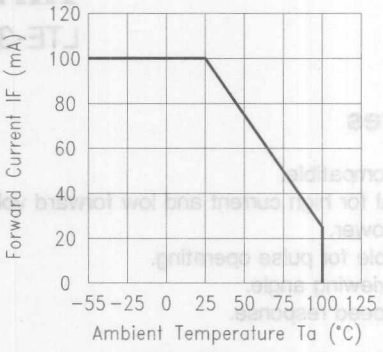


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

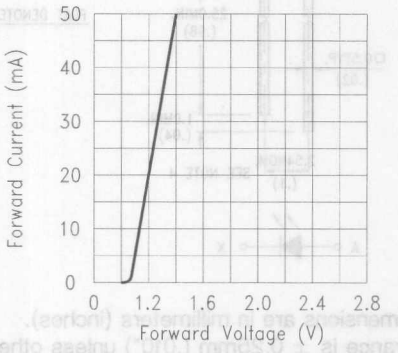


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

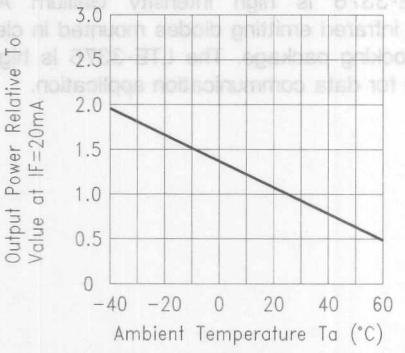


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

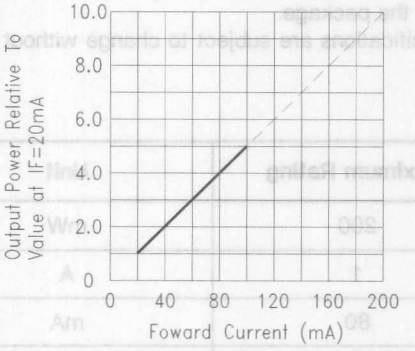


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

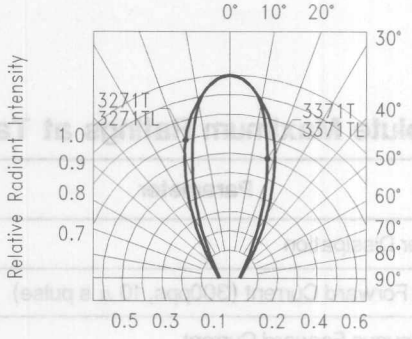


FIG.6 RADIATION DIAGRAM

GaAlAs T-13/4 Standard 5 ϕ High Speed Infrared Emitting Diode

LTE-3376

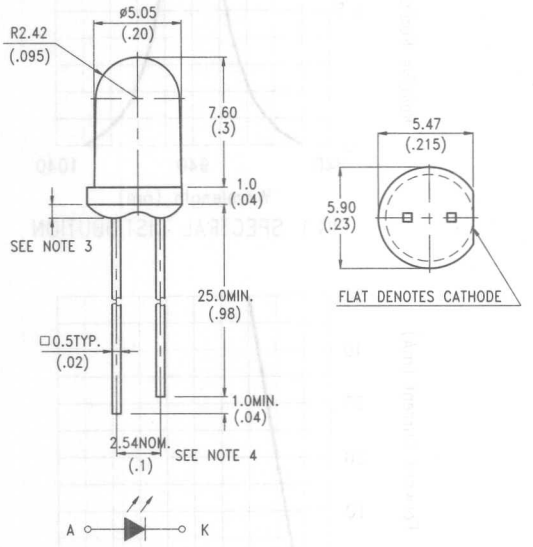
Features

- IrDA compatible.
- Special for high current and low forward voltage.
- High power.
- Available for pulse operating.
- Wide viewing angle.
- High speed response.

Description

The LTE-3376 is high intensity Gallium Aluminum Arsenide infrared emitting diodes mounted in clear plastic end looking package. The LTE-3376 is high speed response for data communication application.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	200	mW
Peak Forward Current (300pps, 10 μ s pulse)	1	A
Continuous Forward Current	80	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
*Aperture Radiant Incidence	Ee	4.0	6.0		mW/cm^2	I_F=50mA
Radiant Intensity	Ie	30	45		mW/sr	I_F=50mA
Peak Emission Wavelength	λ Peak		850		nm	I_F=50mA
Spectral Line Half-Width	△ λ		50		nm	I_F=50mA
Forward Voltage	V_F		1.6	2.0	V	I_F=50mA
Reverse Current	I_R			100	μ A	V_R=5V
Viewing Angle (See FIG.6)	2 θ 1/2		30		deg	
Rise / Fall Time	T_r/T_f		30		nS	10%~90%

Note: *Ee is a measurement of the average radiant incidence upon a sensing area $1cm^2$ in perpendicular to and centered on the mechanical axis of the lens and 26.8mm from lens.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

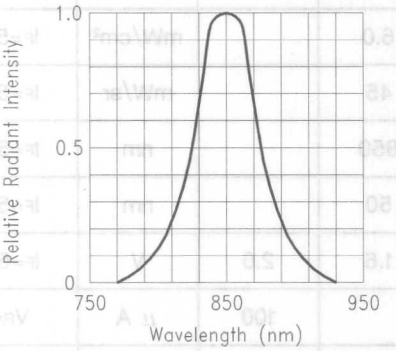


FIG.1 SPECTRAL DISTRIBUTION

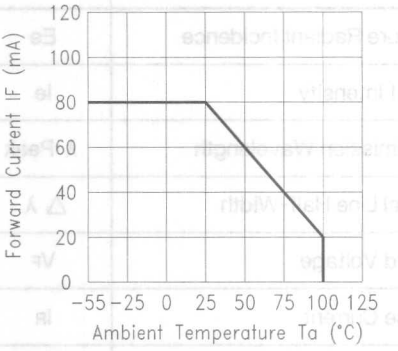


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

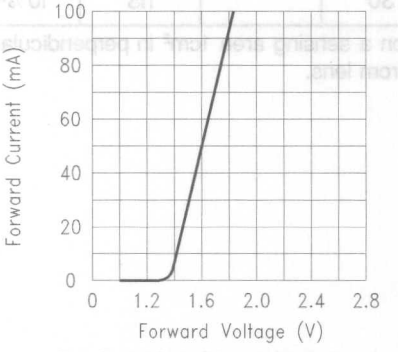


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

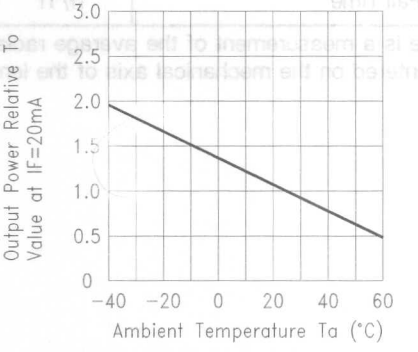


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

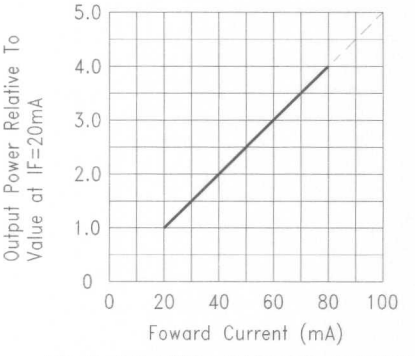


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

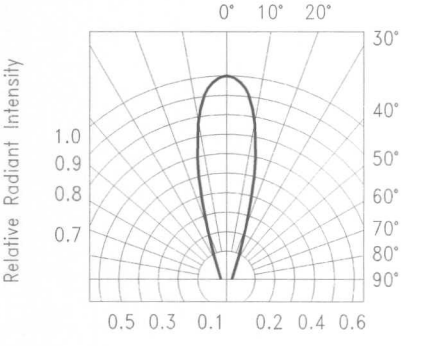


FIG.6 RADIATION DIAGRAM

GaAs Plastic Side Look Infrared Emitting Diode

LTE-302-M/LTE-309

Features

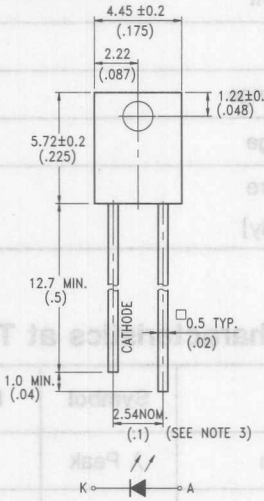
- Selected to specific on-line intensity and radiant intensity ranges.
- Low cost plastic end looking package.
- Mechanically and spectrally matched to the LTR-5576D/LTR-5986DH series of phototransistor.
- The LTE-302 series are made with Gallium Arsenide infrared emitting diodes.

Description

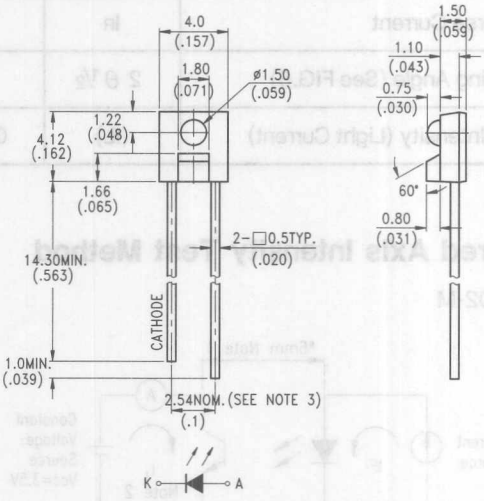
The LTE-302-M/LTE-309 series are high intensity Gallium Arsenide infrared emitting diodes mounted in clear plastic side looking packages. The LTE-302-M/LTE-309 series provides a broad range of intensity selection.

Package Dimensions

LTE-302-M



LTE-309



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

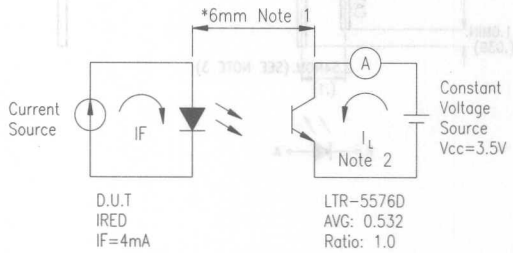
Parameter	Maximum Rating	Unit
Power Dissipation	75	mW
Peak Forward Current (300pps, 10 μ s pulse)	1	A
Continuous Forward Current	50	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Peak Emission Wavelength	λ Peak		940		nm	I_F=20mA
Spectral Line Half-Width	$\Delta\lambda$		50		nm	I_F=20mA
Forward Voltage	V_F		1.2	1.6	V	I_F=20mA
Reverse Current	I_R			100	μ A	V_R=5V
Viewing Angle (See FIG.6)	2 θ 1/2		40		deg	
Axis Intensity (Light Current)	(IL)	0.25		0.85	mA	I_F=4mA V_{CC}=3.5V

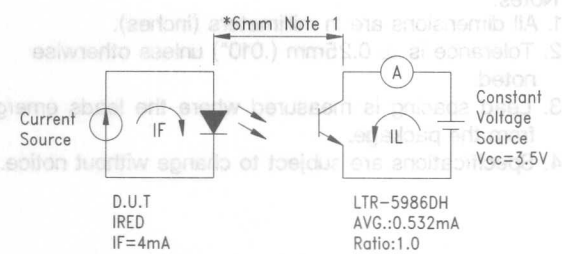
Infrared Axis Intensity Test Method

LTE-302-M



Note: 1.Lead frame to lead frame

LTE-309



NOTE: 1. Lead frame to Lead frame

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

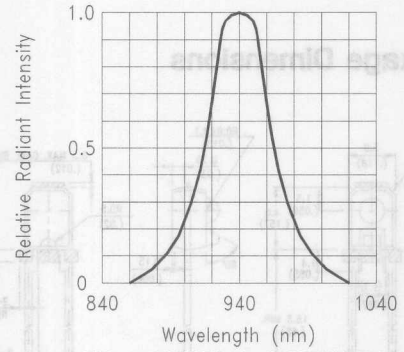


FIG.1 SPECTRAL DISTRIBUTION

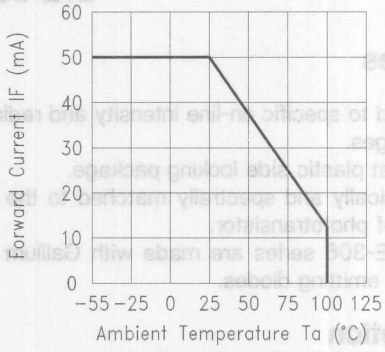


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

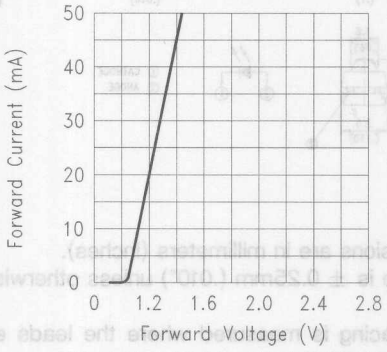


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

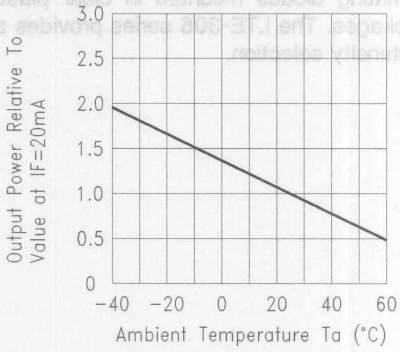


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

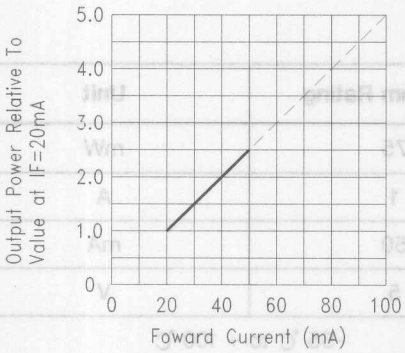


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

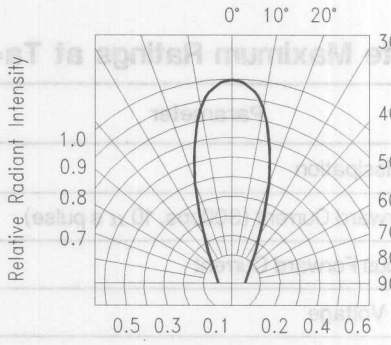


FIG.6 RADIATION DIAGRAM

LITEON

GaAs Plastic Side Look Infrared Emitting Diode

LTE-306

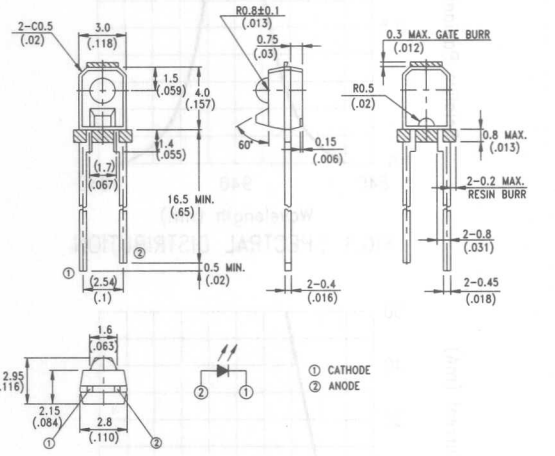
Features

- Selected to specific on-line intensity and radiant intensity ranges.
- Low cost plastic side looking package.
- Mechanically and spectrally matched to the LTR-306 series of phototransistor.
- The LTE-306 series are made with Gallium Arsenide infrared emitting diodes.

Description

The LTE-306 series are high intensity Gallium Arsenide infrared emitting diodes mounted in clear plastic side looking packages. The LTE-306 series provides a broad range of intensity selection.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	75	mW
Peak Forward Current (300pps, 10 μ s pulse)	1	A
Continuous Forward Current	50	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
*Aperture Radiant Incidence	Ee	0.07	0.2		mW/cm^2	I_F=20mA
Radiant Intensity	Ie	0.53	1.5		mW/sr	I_F=20mA
Peak Emission Wavelength	λ Peak		940		nm	I_F=20mA
Spectral Line Half-Width	Δ λ		50		nm	I_F=20mA
Forward Voltage	V_F		1.2	1.6	V	I_F=20mA
Reverse Current	I_R			100	μ A	V_R=5V
Viewing Angle (See FIG.6)	2 θ 1/2		30		deg	

Note: *Ee is a measurement of the average radiant incidence upon a sensing area $1cm^2$ in perpendicular to and centered on the mechanical axis of the lens and 26.8mm from lens.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

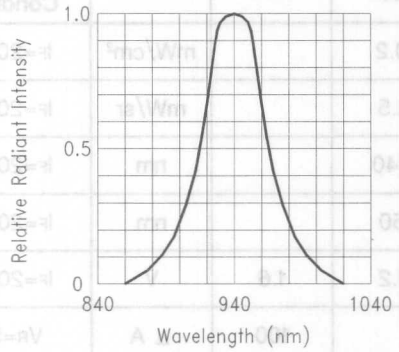


FIG.1 SPECTRAL DISTRIBUTION

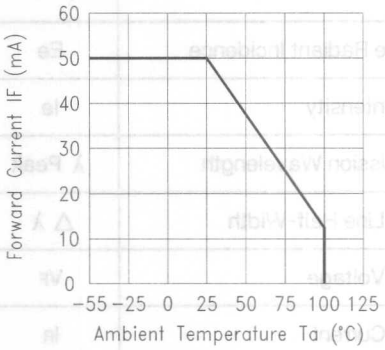


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

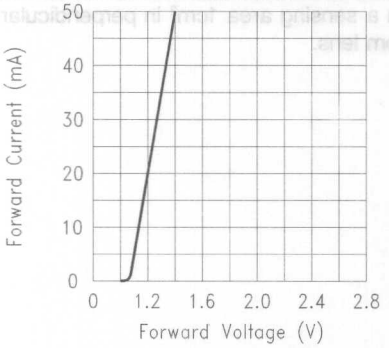


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

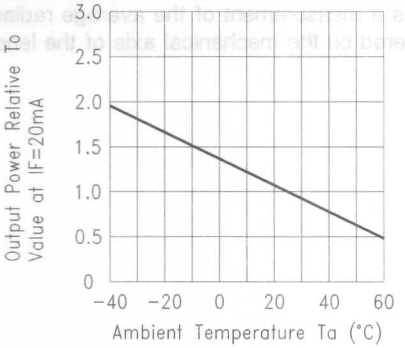


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

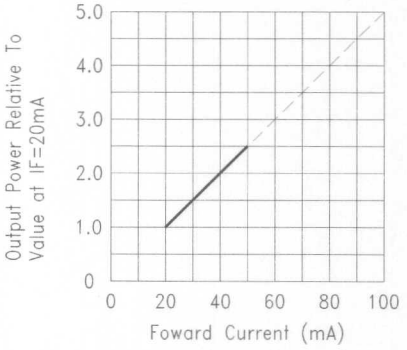


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

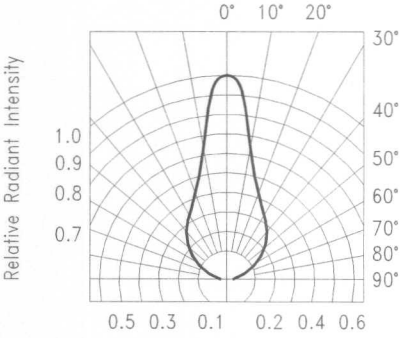


FIG.6 RADIATION DIAGRAM

LITEON

GaAlAs T-1¾ Standard 5 ϕ Infrared Emitting Diode

LTE-4238/LTE-4238C/LTE-5238A/LTE-5238AC

Features

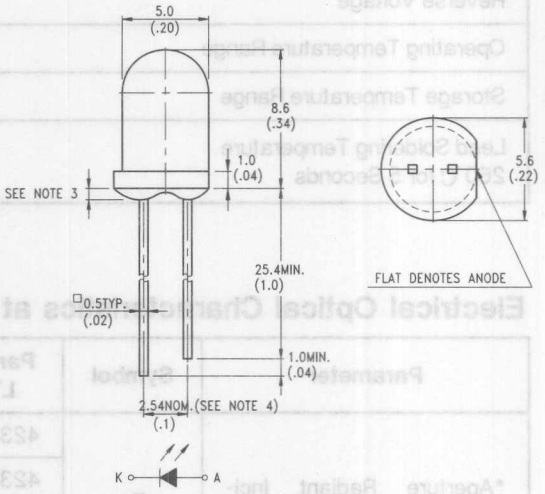
- Selected to specific on-line intensity and radiant intensity ranges.
- High power out put.
- Mechanically and spectrally matched to the LTR-3208 series of phototransistor.
- Wavelength is 880nm.

Description

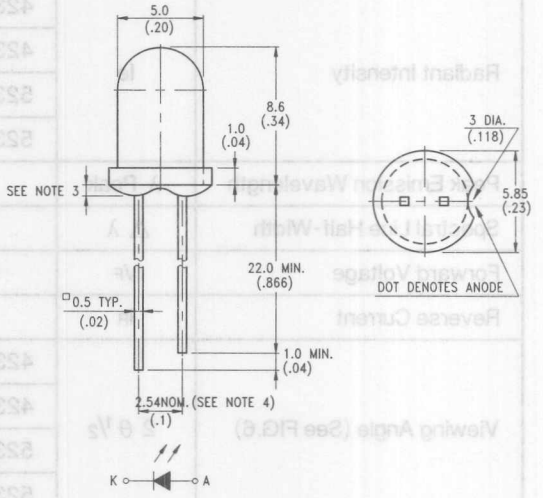
The LTE-4238 series and LTE-5238A series are high intensity Gallium Aluminum Arsenide infrared emitting diodes mounted in clear plastic end looking packages. Gallium Aluminum Arsenide features a significant increase in the radiated output of Gallium Arsenide at the same forward current. Also with a wavelength centered at 880nanometers it more closely of silicon phototransistor.

Package Dimensions

LTE-4238/LTE-4238C



LTE-5238A/LTE-5238AC



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta =25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	150	mW
Peak Forward Current (300pps, 10 μ s pulse)	2	A
Continuous Forward Current	100	mA
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature 260 ℃ for 5 Seconds	[1.6mm (.063 in.) from body]	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Part No. LTE-	Min.	Typ.	Max.	Unit	Test Condition
*Aperture Radiant Incidence	Ee	4238	0.80	1.4		mW/cm^2	I_F=20mA
		4238C					
		5238A	0.5	1.0			
		5238AC					
Radiant Intensity	Ie	4238	6.0	10.5		mW/sr	I_F=20mA
		4238C					
		5238A	3.8	7.5			
		5238AC					
Peak Emission Wavelength	λ Peak			880		nm	I_F=20mA
Spectral Line Half-Width	$\Delta\lambda$			50		nm	I_F=20mA
Forward Voltage	V_F			1.3	1.8	V	I_F=20mA
Reverse Current	I_R				100	μ A	V_R=5V
Viewing Angle (See FIG.6)	2 θ 1/2	4238		20		deg	
		4238C					
		5238A		40			
		5238AC					

Note: *Ee is a measurement of the average radiant incidence upon a sensing area 1cm^2 in perpendicular to and centered on the mechanical axis of the lens and 26.8mm from lens.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

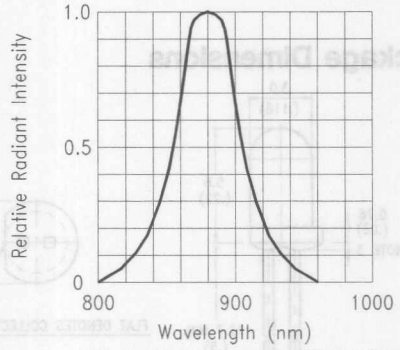


FIG.1 SPECTRAL DISTRIBUTION

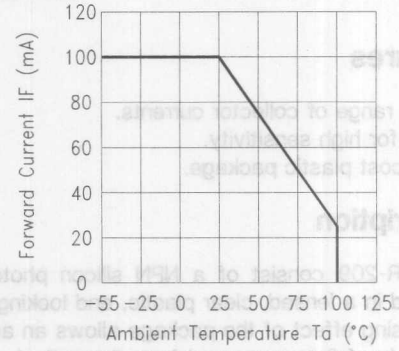


FIG.2 FORWARD CURRENT VS. AMBIENT TEMPERATURE

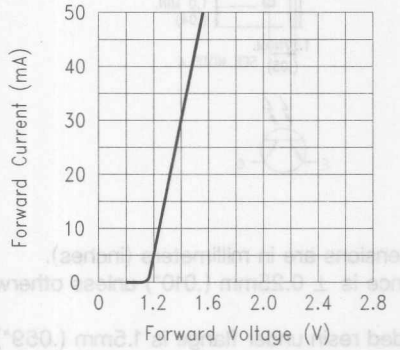


FIG.3 FORWARD CURRENT VS. FORWARD VOLTAGE

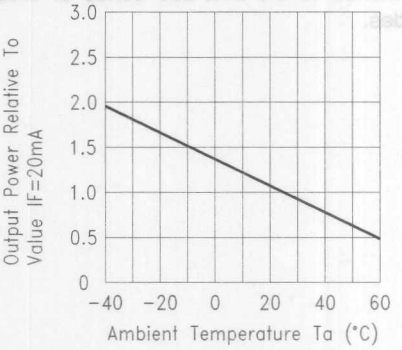


FIG.4 RELATIVE RADIANT INTENSITY VS. AMBIENT TEMPERATURE

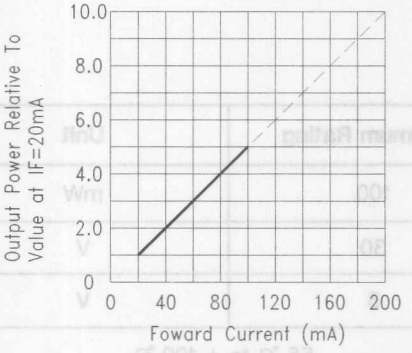


FIG.5 RELATIVE RADIANT INTENSITY VS. FORWARD CURRENT

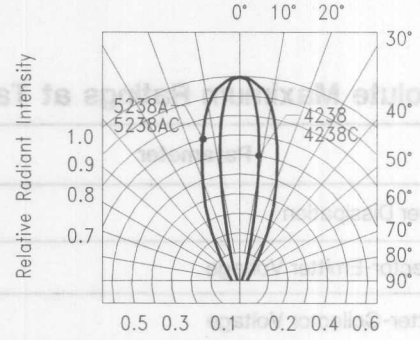


FIG.6 RADIATION DIAGRAM

LITEON

NPN T-1 Modified 3 ϕ Phototransistor

LTR-209

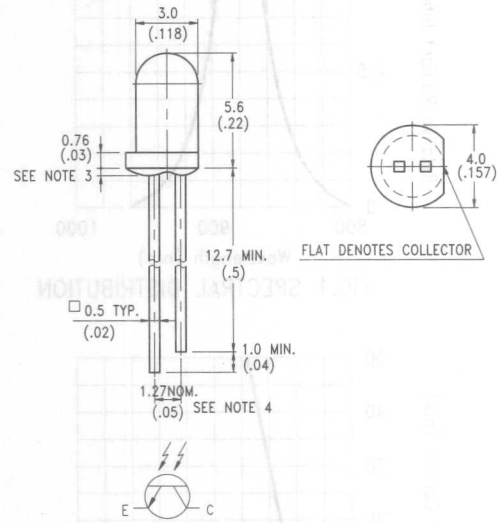
Features

- Wide range of collector currents.
- Lens for high sensitivity.
- Low cost plastic package.

Description

The LTR-209 consist of a NPN silicon phototransistor mounted in a lensed, clear plastic, end looking package. The lensing effect of the package allows an acceptance half angle of 8 ° measured from the optical axis to the half power point. This series is mechanically and spectrally matched to the LTE-209 series of infrared emitting diodes.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	100	mW
Collector-Emitter Voltage	30	V
Emitter-Collector Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=1mA Ee=0mW/cm^2
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5			V	I_E=100 μ A Ee=0mW/cm^2
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=100 μ A Ee=1mW/cm^2
Rise Time	T_r		10		μ S	V_{CC}=5V I_C=1mA R_L=1K Ω
Fall Time	T_f		15		μ S	
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=10V Ee=0mW/cm^2
On State Collector Current	$I_{C(ON)}$	1	4		mA	V_{CE}=5V Ee=1mW/cm^2 λ =940nm

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

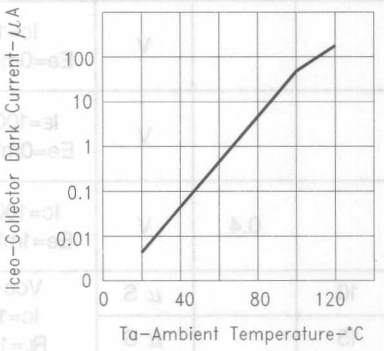


FIG.1 COLLECTOR DARK CURRENT VS AMBIENT TEMPERATURE

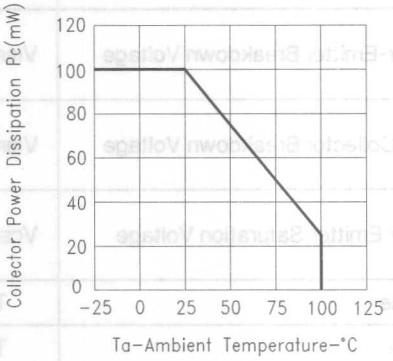


FIG.2 COLLECTOR POWER DISSIPATION VS AMBIENT TEMPERATURE

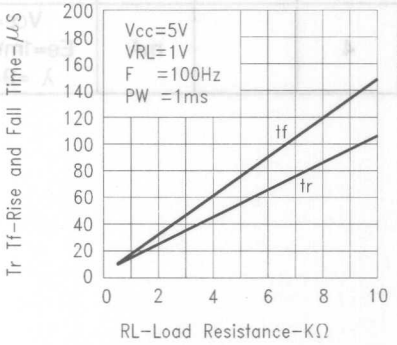


FIG.3 RISE AND FALL TIME VS LOAD RESISTANCE

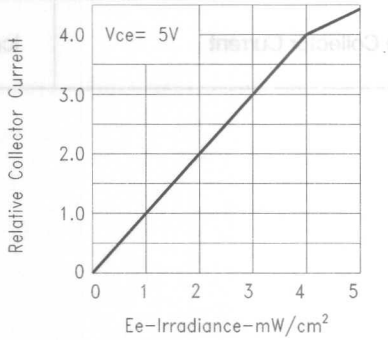


FIG.4 RELATIVE COLLECTOR CURRENT VS IRRADIANCE

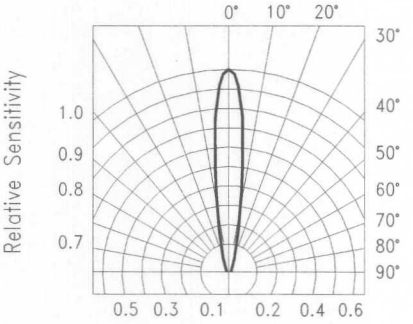


FIG.5 SENSITIVITY DIAGRAM

LITEON NPN T-1 Standard Phototransistor

LTR-4206/LTR-4206E

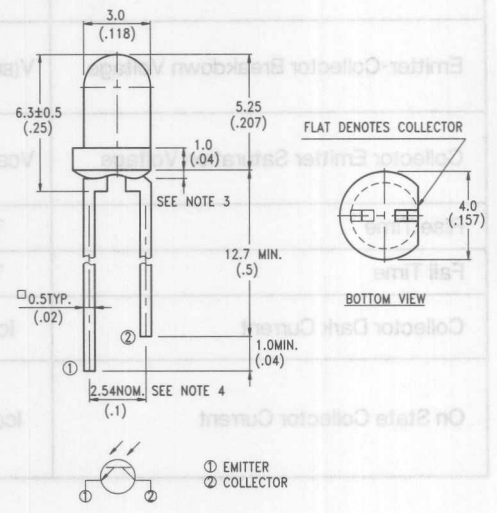
Features

- Wide range of collector currents.
- Lens for high sensitivity.
- Low cost plastic package.

Description

The LTR-4206 series consist of a NPN silicon phototransistor mounted in a lensed, clear plastic, end looking package. The lensing effect of the package allows an acceptance half angle of 10 ° measured from the optical axis to the half power point. This series is mechanically and spectrally matched to the LTE-4206 series of infrared emitting diodes. The LTR-4206E is a special dark plastic package that cut the visible light and suitable for the detectors of infrared application.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	100	mW
Collector-Emitter Voltage	30	V
Emitter-Collector Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Part No. LTR-	Min.	Typ.	Max.	Unit	Test Condition
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$		30			V	I_C=1mA Ee=0mW/cm^2
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$		5			V	I_E=100 μ A Ee=0mW/cm^2
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$				0.4	V	I_C=100 μ A Ee=1mW/cm^2
Rise Time	T_r			10		μ S	V_{CC}=5V I_C=1mA R_L=1K Ω
Fall Time	T_f			15		μ S	
Collector Dark Current	I_{CEO}				100	nA	V_{CE}=10V Ee=0mW/cm^2
On State Collector Current	$I_{C(ON)}$	4206	1	4		mA	V_{CE}=5V Ee=1mW/cm^2 λ =940nm
		4206E	1	2		mA	

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

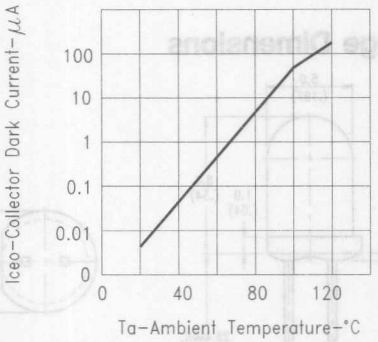


FIG.1 COLLECTOR DARK CURRENT VS AMBIENT TEMPERATURE

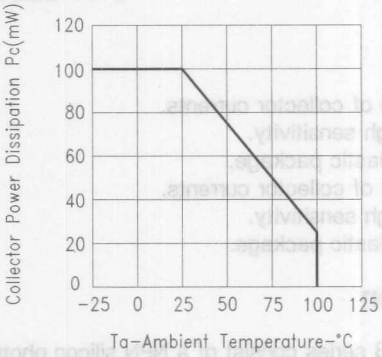


FIG.2 COLLECTOR POWER DISSIPATION VS AMBIENT TEMPERATURE

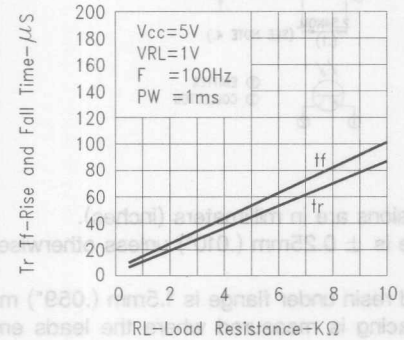


FIG.3 RISE AND FALL TIME VS LOAD RESISTANCE

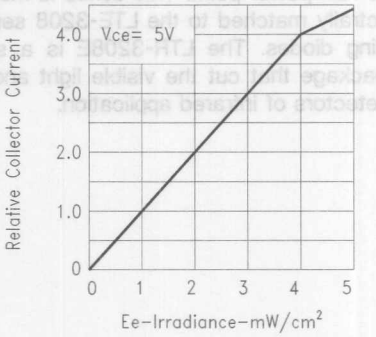


FIG.4 RELATIVE COLLECTOR CURRENT VS IRRADIANCE

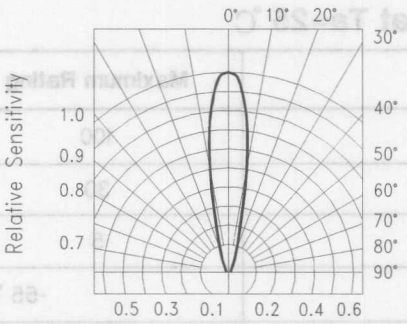


FIG.5 SENSITIVITY DIAGRAM

LITEON

NPN T-1¾ Standard 5 ϕ Phototransistor

LTR-3208/LTR-3208E

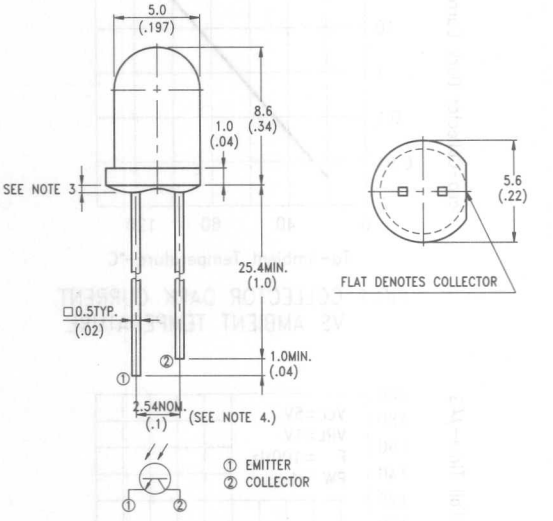
Features

- Wide range of collector currents.
- Lens for high sensitivity.
- Low cost plastic package.
- Wide range of collector currents.
- Lens for high sensitivity.
- Low cost plastic package.

Description

The LTR-3208 series consist of a NPN silicon phototransistor mounted in a lensed, clear plastic, end looking package. The lensing effect of the package allows an acceptance half angle of 10 ° measured from the optical axis to the half power point. This series is mechanically and spectrally matched to the LTE-3208 series of infrared emitting diodes. The LTR-3208E is a special dark plastic package that cut the visible light and suitable for the detectors of infrared application.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	100	mW
Collector-Emitter Voltage	30	V
Emitter-Collector Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Part No. LTR-	Min.	Typ.	Max.	Unit	Test Condition
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$		30			V	I_C=1mA Ee=0mW/cm^2
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$		5			V	I_E=100 μ A Ee=0mW/cm^2
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$				0.4	V	I_C=100 μ A Ee=1mW/cm^2
Rise Time	T_r			10		μ S	V_{CC}=5V I_C=1mA R_L=1K Ω
Fall Time	T_f			15		μ S	
Collector Dark Current	I_{CEO}				100	nA	V_{CE}=10V Ee=0mW/cm^2
On State Collector Current	$I_{C(ON)}$	3208	1	4		mA	V_{CE}=5V Ee=1mW/cm^2 λ =940nm
		3208E	1	2		mA	

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

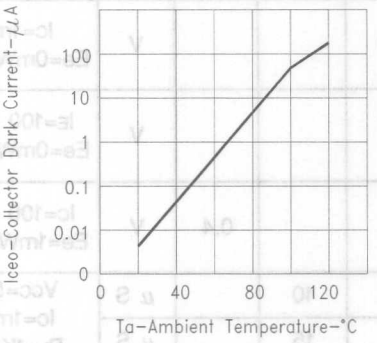


FIG.1 COLLECTOR DARK CURRENT VS AMBIENT TEMPERATURE

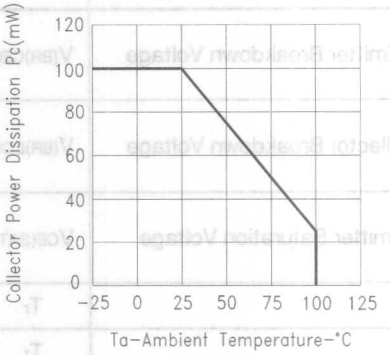


FIG.2 COLLECTOR POWER DISSIPATION VS AMBIENT TEMPERATURE

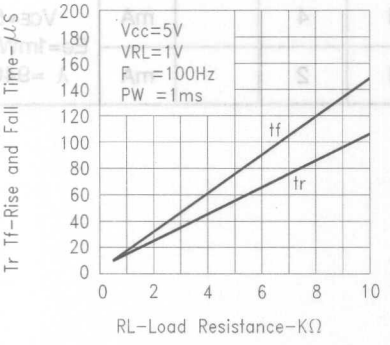


FIG.3 RISE AND FALL TIME VS LOAD RESISTANCE

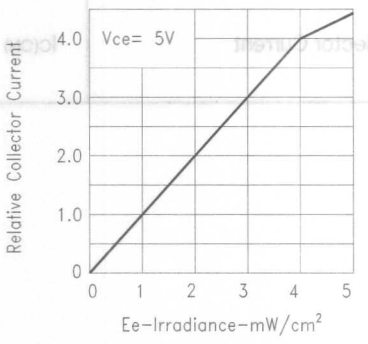


FIG.4 RELATIVE COLLECTOR CURRENT VS IRRADIANCE

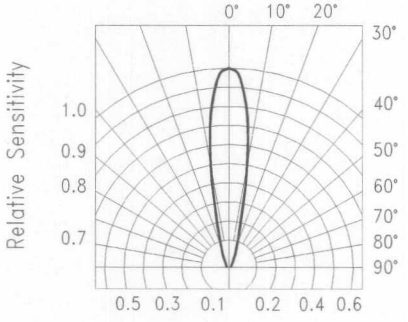


FIG.5 SENSITIVITY DIAGRAM

NPN Plastic Side Look Phototransistor

LTR-301/LTR-309

Features

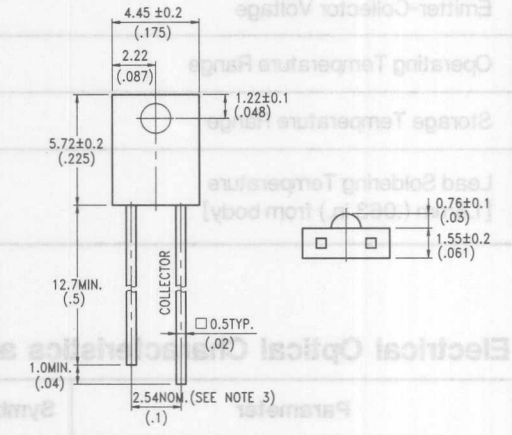
- Wide range of collector currents.
- Lens for high sensitivity.
- Low cost plastic package.

Description

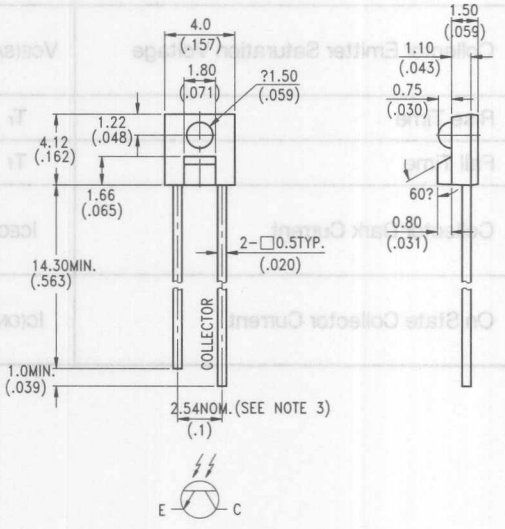
The LTR-301/LTR-309 consist of a NPN silicon phototransistor mounted in a lensed, clear plastic, end looking package. The lensing effect of the package allows an acceptance half angle of 20 ° measured from the optical axis to the half power point. This series is mechanically and spectrally matched to the LTE-302/LTE-309 of infrared emitting diodes.

Package Dimensions

LTR-301



LTR-309



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	100	mW
Collector-Emitter Voltage	30	V
Emitter-Collector Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=1mA Ee=0mW/cm^2
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5			V	I_E=100 μ A Ee=0mW/cm^2
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=100 μ A Ee=1mW/cm^2
Rise Time	T_r		10		μ S	V_{CC}=5V I_C=1mA R_L=1K Ω
Fall Time	T_f		15		μ S	
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=10V Ee=0mW/cm^2
On State Collector Current	$I_{C(ON)}$	0.2	1		mA	V_{CE}=5V Ee=1mW/cm^2 λ =940nm

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

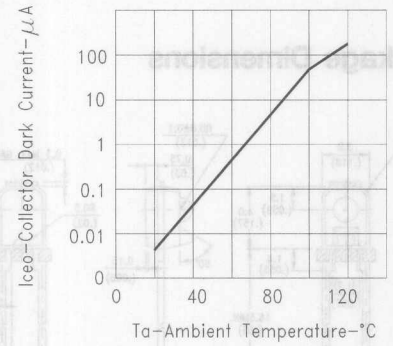


FIG.1 COLLECTOR DARK CURRENT VS AMBIENT TEMPERATURE

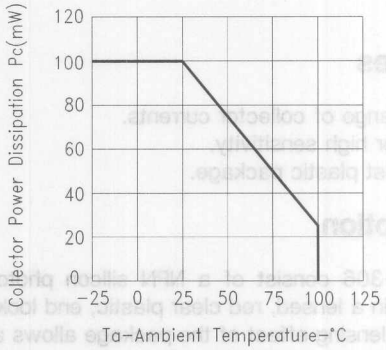


FIG.2 COLLECTOR POWER DISSIPATION VS AMBIENT TEMPERATURE

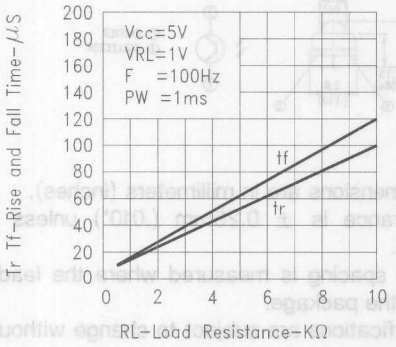


FIG.3 RISE AND FALL TIME VS LOAD RESISTANCE

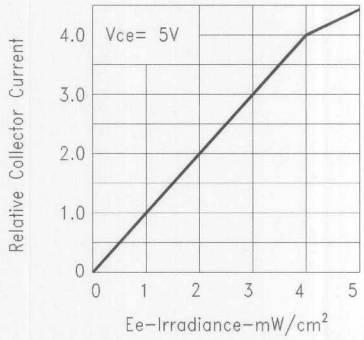


FIG.4 RELATIVE COLLECTOR CURRENT VS IRRADIANCE

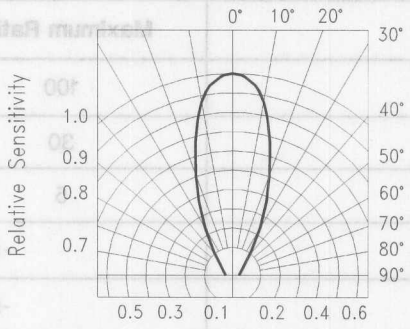


FIG.5 SENSITIVITY DIAGRAM

LITEON

NPN Plastic Side Look Phototransistor

LTR-306

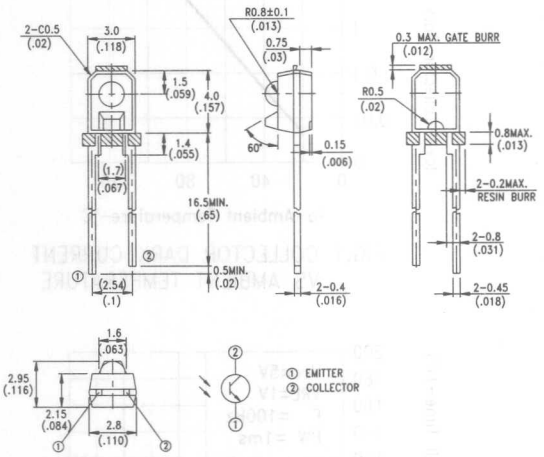
Features

- Wide range of collector currents.
- Lens for high sensitivity.
- Low cost plastic package.

Description

The LTR-306 consist of a NPN silicon phototransistor mounted in a lensed, red clear plastic, end looking package. The lensing effect of the package allows an acceptance half angle of 15 ° measured from the optical axis to the half power point. This series is mechanically and spectrally matched to the LTE-306 series of infrared emitting diodes.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	100	mW
Collector-Emitter Voltage	30	V
Emitter-Collector Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=1mA Ee=0mW/cm^2
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5			V	I_E=100 μ A Ee=0mW/cm^2
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=100 μ A Ee=1mW/cm^2
Rise Time	T_r		10		μ S	V_{CC}=5V I_C=1mA R_L=1K Ω
Fall Time	T_f		15		μ S	
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=10V Ee=0mW/cm^2
On State Collector Current	$I_{C(ON)}$	0.2	1		mA	V_{CE}=5V Ee=1mW/cm^2 λ =940nm

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

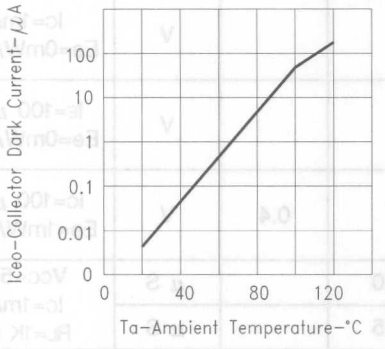


FIG.1 COLLECTOR DARK CURRENT VS AMBIENT TEMPERATURE

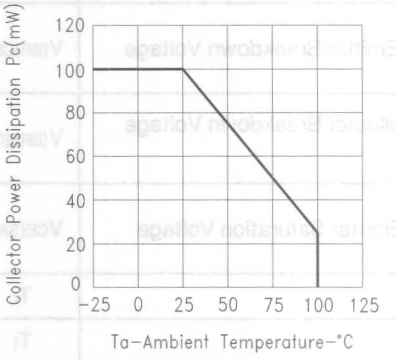


FIG.2 COLLECTOR POWER DISSIPATION VS AMBIENT TEMPERATURE

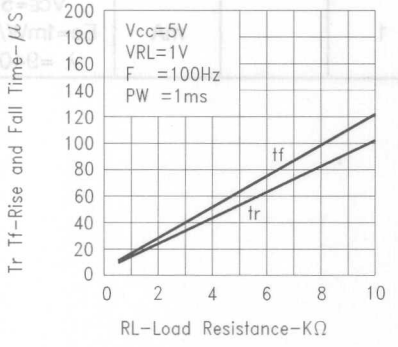


FIG.3 RISE AND FALL TIME VS LOAD RESISTANCE

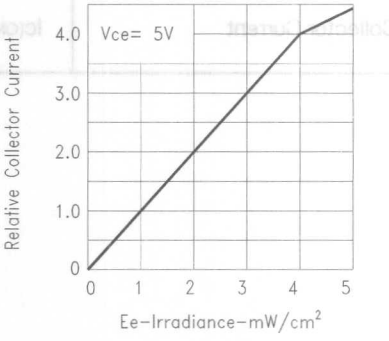


FIG.4 RELATIVE COLLECTOR CURRENT VS IRRADIANCE

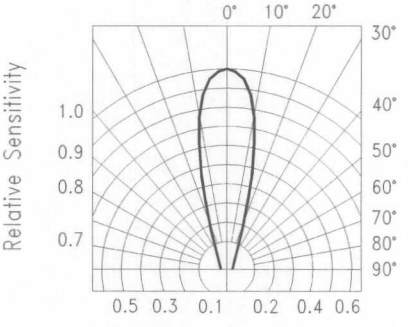


FIG.5 SENSITIVITY DIAGRAM

NPN Black Plastic Two Bits Phototransistor

LTR-5576D/LTR-5986D

Features

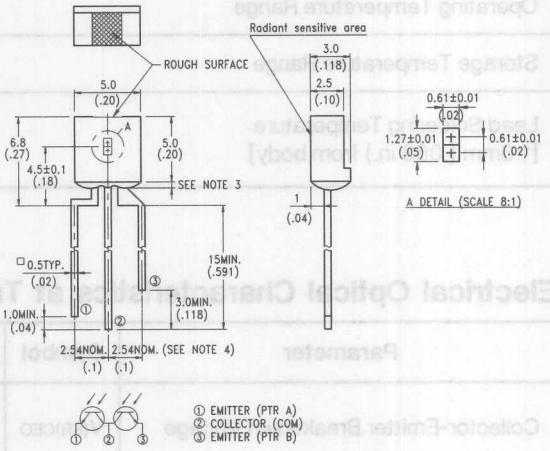
- Wide range of collector currents.
- High sensitivity.
- Fast switching time.

Description

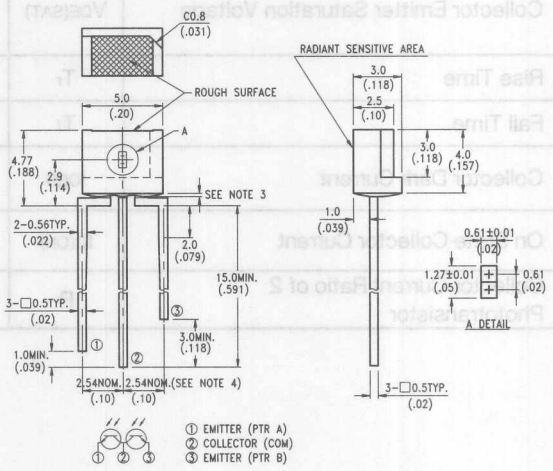
The LTR-5576D and LTR-5986D are special dark plastic package that cut the visible for the detector and coupled with LTE-309 and LTE-302 for mouse & photoencoder application.

Package Dimensions

LTR-5576D



LTR-5986D



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	100	mW
Collector-Emitter Voltage	30	V
Emitter-Collector Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=1mA Ee=0mW/cm^2
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5			V	I_E=100 μ A Ee=0mW/cm^2
Collector Emitter Saturation Voltage	$V_{CE(SAT)}$		0.1	0.4	V	I_C=100 μ A Ee=1mW/cm^2
Rise Time	T_r		15		μ S	V_{CC}=5V I_C=1mA R_L=1K Ω
Fall Time	T_f		18		μ S	
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=10V Ee=0mW/cm^2
On State Collector Current	$I_{C(ON)}$	0.16	0.4		mA	V_{CE}=5V Ee=1mW/cm^2
Collector Current Ratio of 2 Phototransistor	R	0.8	1.0	1.25		$I_{C(on)(a)}/I_{C(on)(b)}$

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

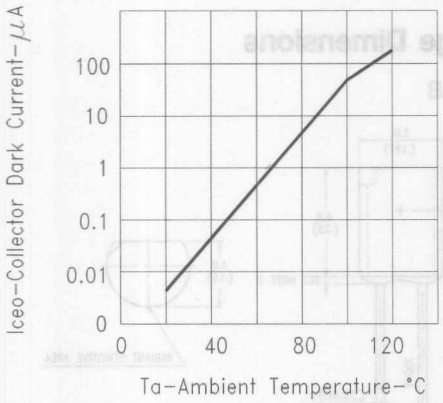


FIG.1 COLLECTOR DARK CURRENT VS AMBIENT TEMPERATURE

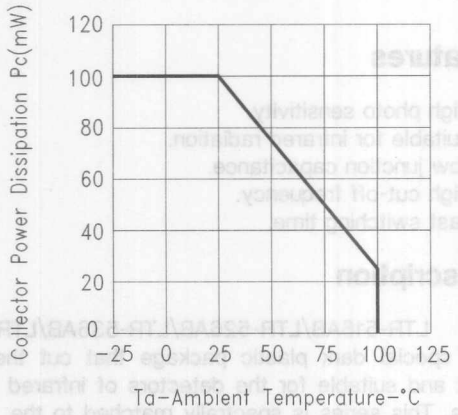


FIG.2 COLLECTOR POWER DISSIPATION VS AMBIENT TEMPERATURE

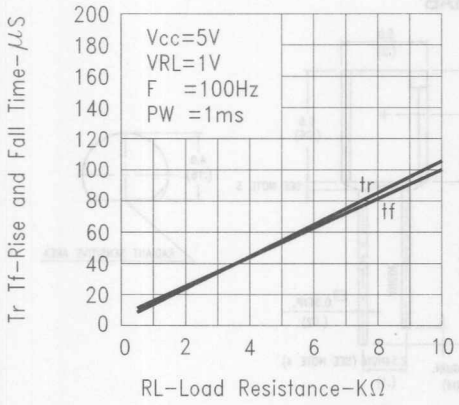


FIG.3 RISE AND FALL TIME VS LOAD RESISTANCE

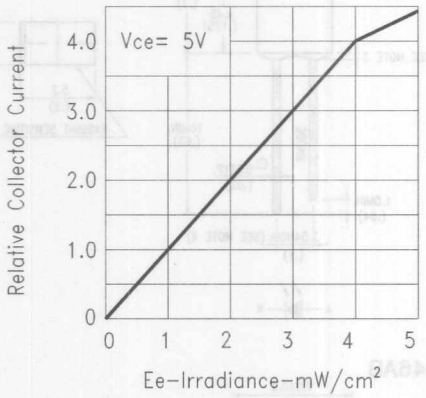


FIG.4 RELATIVE COLLECTOR CURRENT VS IRRADIANCE

LITEON

Black Plastic Photodiode

LTR-516AB/LTR-526AB/LTR-536AB/LTR-546AB

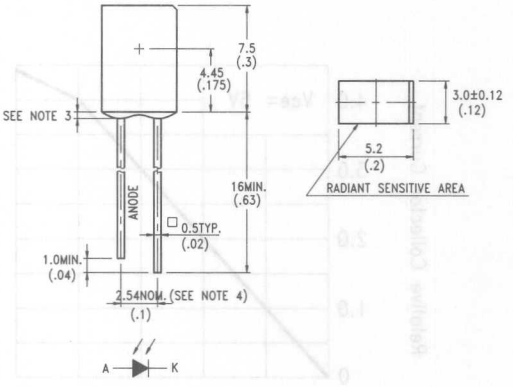
Features

- High photo sensitivity.
- Suitable for infrared radiation.
- Low junction capacitance.
- High cut-off frequency.
- Fast switching time.

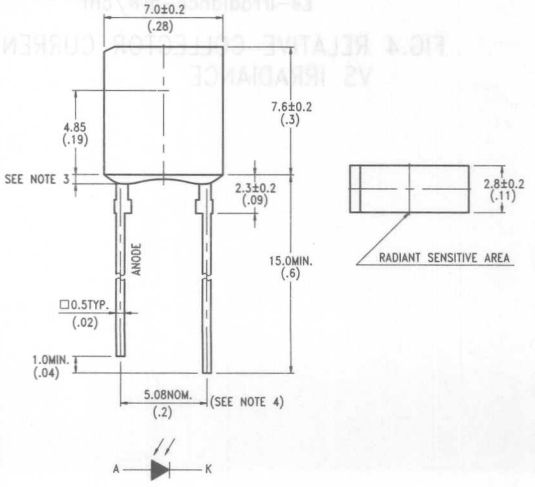
Description

The LTR-516AB/LTR-526AB/LTR-536AB/LTR-546AB are special dark plastic package that cut the visible light and suitable for the detectors of infrared applications. This series is spectrally matched to the LTE-3375/LTE-3376 of infrared emitting diodes.

LTR-536AB

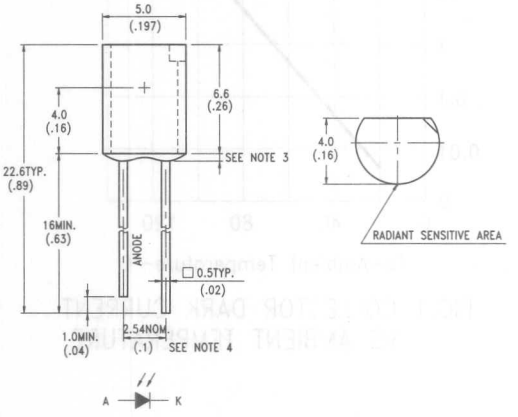


LTR-546AB

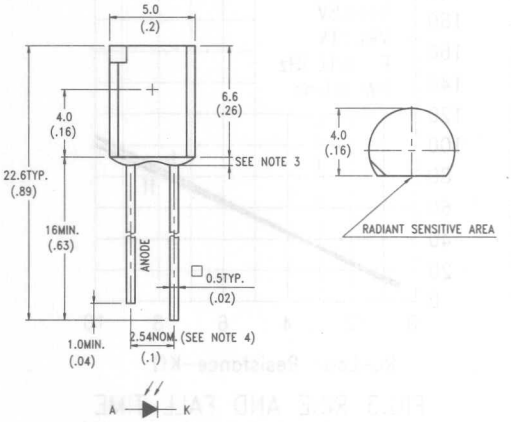


Package Dimensions

LTR-516AB



LTR-526AB



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	150	mW
Reverse Break Down Voltage	30	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Reverse Break Down Voltage	$V_{(BR)R}$	30			V	I_R=100 μ A Ee=0mW/cm^2
Reverse Dark Current	$I_{D(R)}$			30	nA	V_R=10V Ee=0mW/cm^2
Open Circuit Voltage	V_{OC}		350		mV	λ =940nm Ee=0.5mW/cm^2
Rise Time	T_r		50		nsec	V_R=10V λ =940nm R_L=1K Ω
Fall Time	T_f		50		nsec	
Light Current	I_S	1.7	2		μ A	V_R=5V λ =940nm Ee=0.1mW/cm^2
Total Capacitance	C_T		25		pF	R=3V V_F=1MHZ Ee=0mW/cm^2
Wavelength of the Max Sensitivity	λ SMAX		950		nm	

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

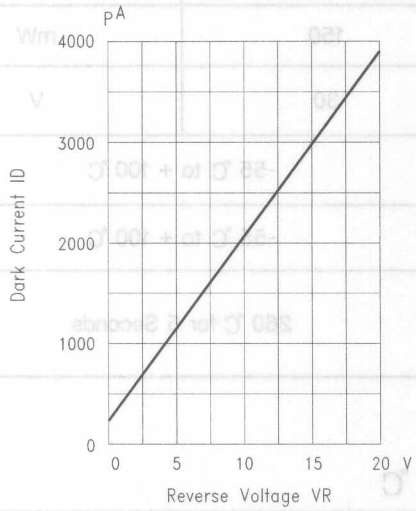


Fig.1 DARK CURRENT VS. REVERSE VOLTAGE
TA=25°C, Ee=0 mW/cm²

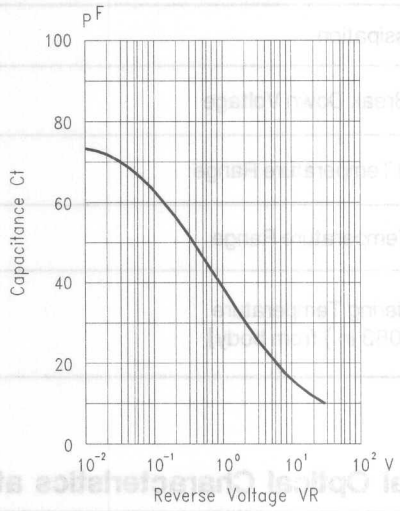


Fig.2 CAPACITANCE VS. REVERSE VOLTAGE
F=1MHZ; Ee=0mW/cm²

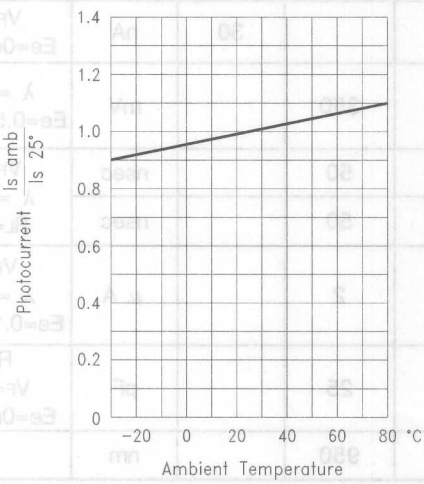


Fig.3 PHOTOCURRENT VS. AMBIENT TEMPERATURE

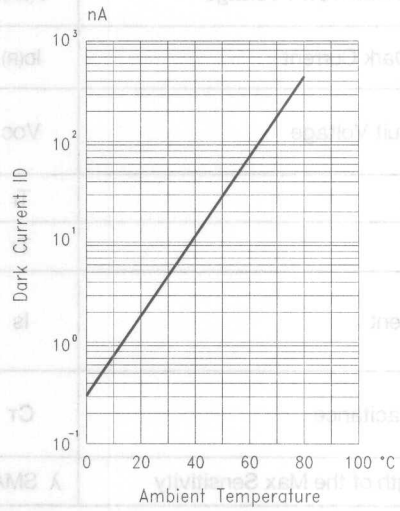


Fig.4 DARK CURRENT AMBIENT TEMPERATURE
VR=10, Ee=0mW/cm²

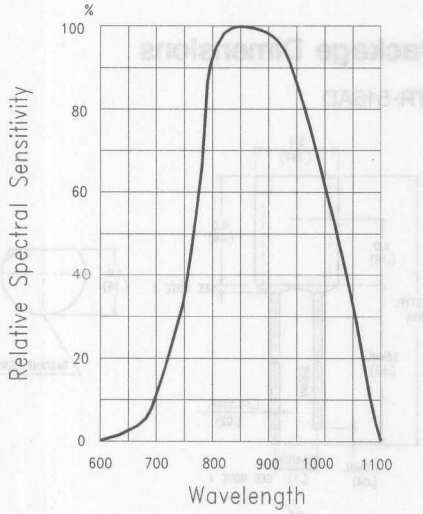


Fig.5 RELATIVE SPECTRAL SENSITIVITY VS WAVELENGTH

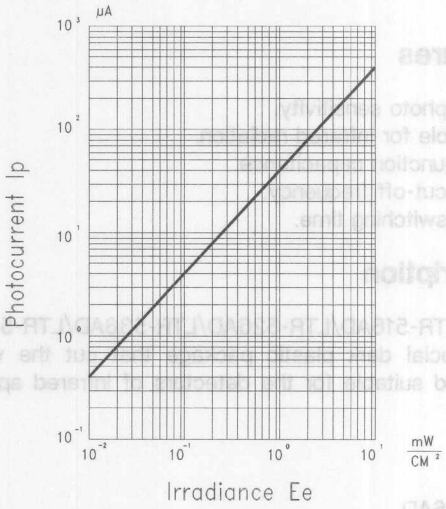


Fig.6 PHOTOCURRENT VS IRRADIANCE = 950 nm

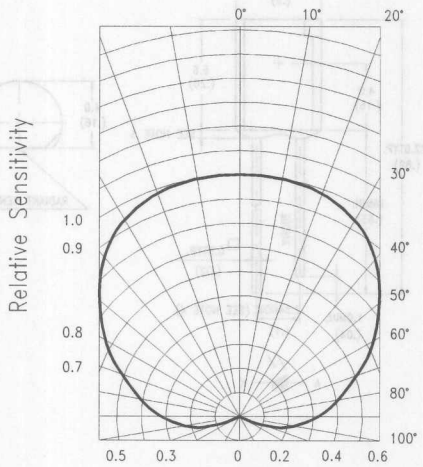


Fig.7 SENSITIVITY DIAGRAM

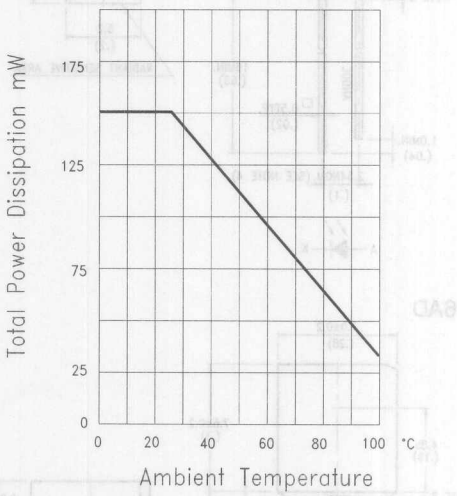


Fig.8 TOTAL POWER DISSIPATION VS AMBIENT TEMPERATURE

Black Plastic Photodiode

LTR-516AD/LTR-526AD/LTR-536AD/LTR-546AD

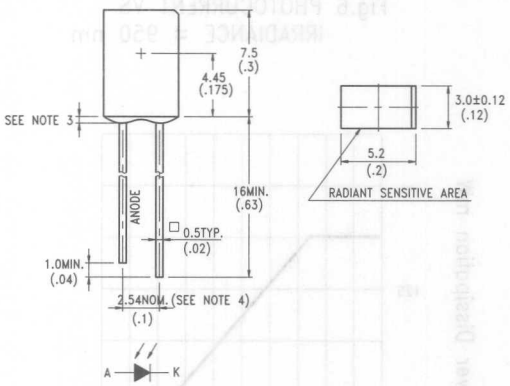
Features

- High photo sensitivity.
- Suitable for infrared radiation.
- Low junction capacitance.
- High cut-off frequency.
- Fast switching time.

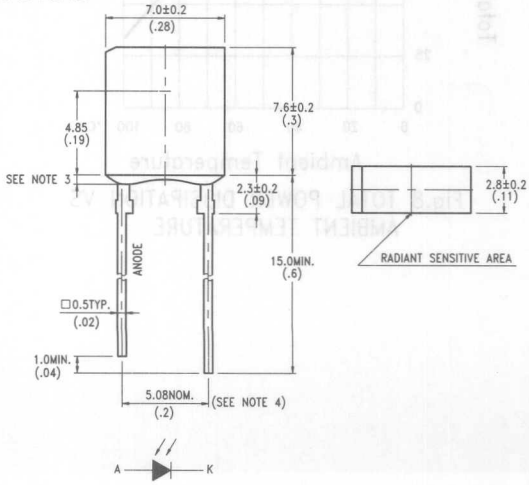
Description

The LTR-516AD/LTR-526AD/LTR-536AD/LTR-546AD are special dark plastic package that cut the visible light and suitable for the detectors of infrared applications.

LTR-536AD

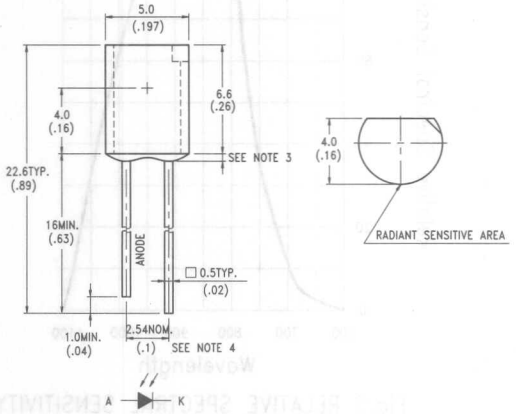


LTR-546AD

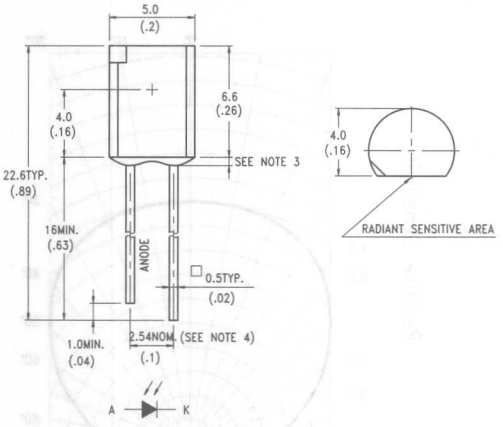


Package Dimensions

LTR-516AD



LTR-526AD



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating	Unit
Power Dissipation	150	mW
Reverse Break Down Voltage	30	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260 ℃ for 5 Seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Reverse Break Down Voltage	$V_{(BR)R}$	30			V	I_R=100 μ A Ee=0mW/cm²
Reverse Dark Current	$I_{D(R)}$			30	nA	V_R=10V Ee=0mW/cm²
Open Circuit Voltage	V_{OC}		350		mV	λ =940nm Ee=0.5mW/cm²
Rise Time	T_r		50		nsec	V_R=10V λ =940nm R_L=1K Ω
Fall Time	T_f		50		nsec	
Light Current	I_S	1.7	2		μ A	V_R=5V λ =940nm Ee=0.1mW/cm²
Total Capacitance	C_T		25		pF	R=3V V_F=1MHZ Ee=0mW/cm²
Wavelength of the Max Sensitivity	λ SMAX		950		nm	

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

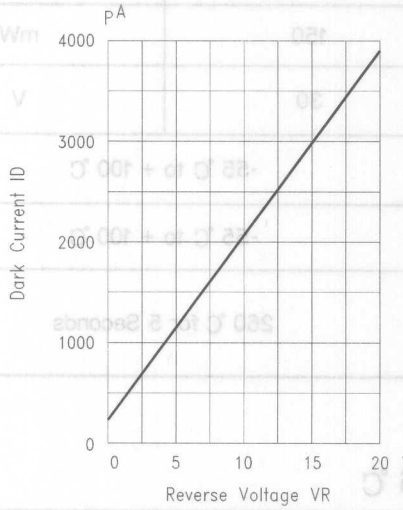


Fig.1 DARK CURRENT VS. REVERSE VOLTAGE
TA=25°C, Ee=0 mW/cm²

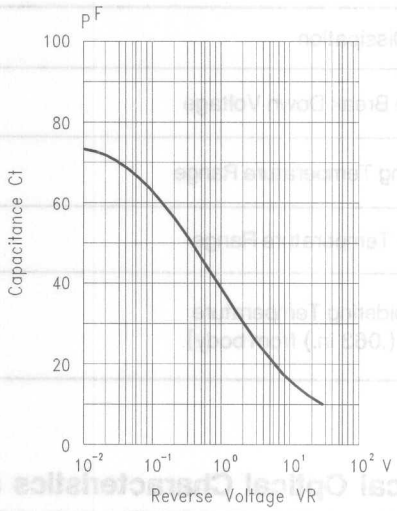


Fig.2 CAPACITANCE VS. REVERSE VOLTAGE
F=1MHZ; Ee=0mW/cm²

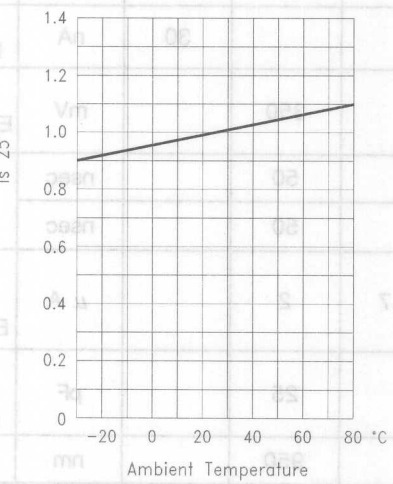


Fig.3 PHOTOCURRENT VS. AMBIENT TEMPERATURE

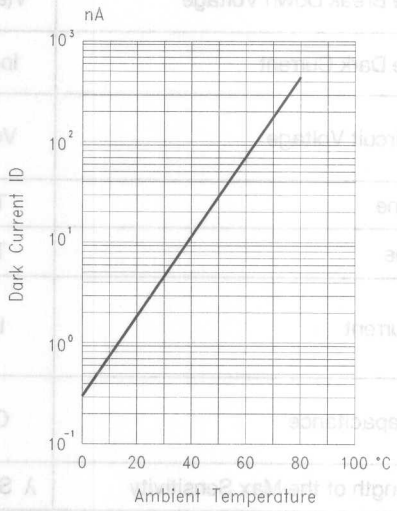


Fig.4 DARK CURRENT AMBIENT TEMPERATURE
VR=10, Ee=0mW/cm²

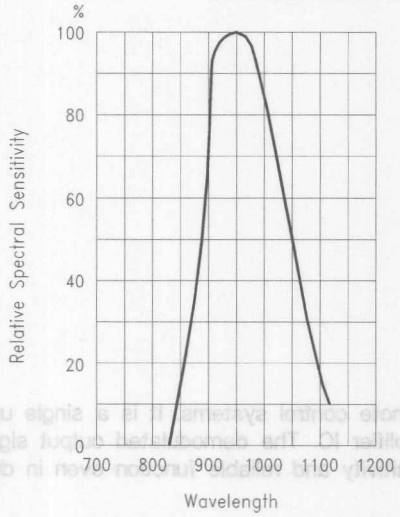


Fig.5 RELATIVE SPECTRAL SENSITIVITY VS. WAVELENGTH

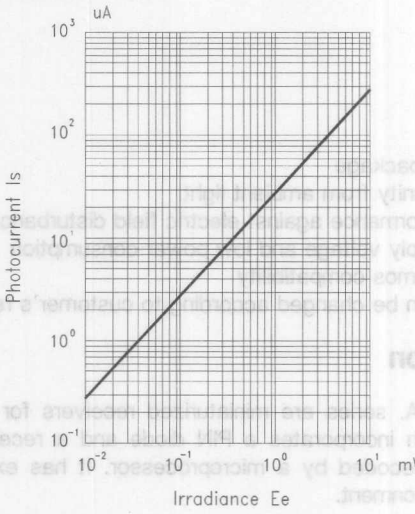


Fig.6 PHOTOCURRENT VS. IRRADIANCE = 950 nm

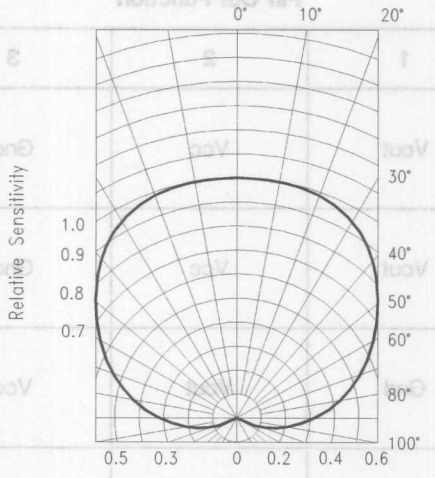


Fig.7 SENSITIVITY DIAGRAM

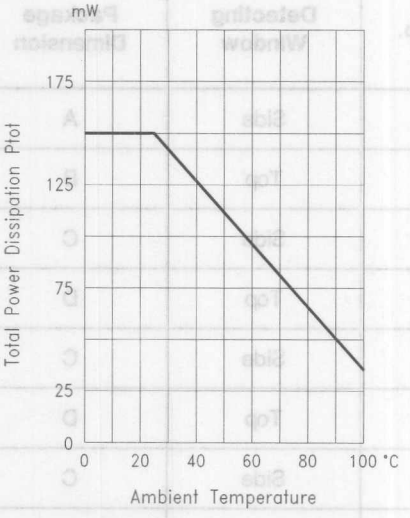


Fig.8 TOTAL POWER DISSIPATION VS. AMBIENT TEMPERATURE

Infrared Remote Control Receiver Module

LTM-97XX Series Technical Data

Features

- Compact package
- High immunity from ambient light
- Good performance against electric field disturbance
- 5 volt supply voltage and low power consumption
- TTL and cmos compatibility
- Pin out can be changed according to customer's requirement

Description

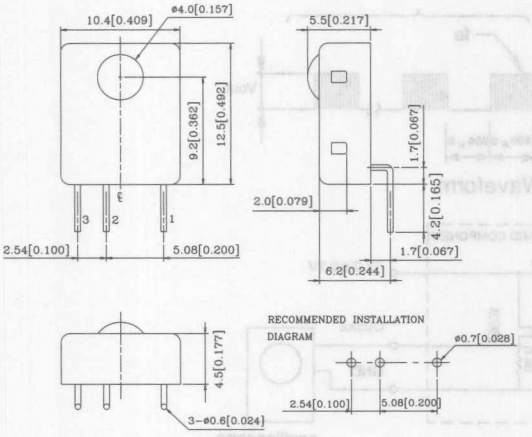
The LTM-97A. series are miniaturized receivers for infrared remote control systems. It is a single unit type module which incorporates a PIN diode and a receiving preamplifier IC. The demodulated output signal can directly be decoded by a microprocessor. It has excellent sensitivity and reliable function even in disturbed working environment.

Device No.

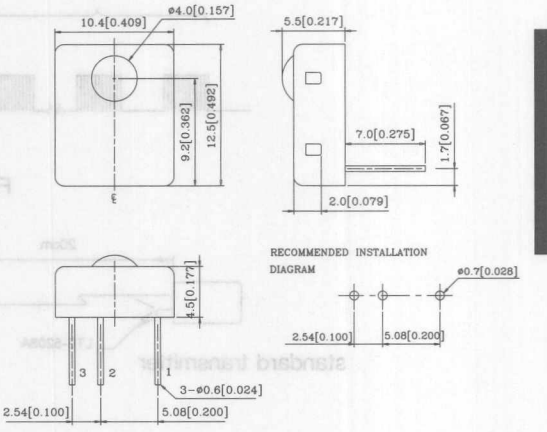
Device No.	Detecting Window	Package Dimension	Pin Out Function		
			1	2	3
LTM-97AS	Side	A	Vout	Vcc	Gnd
LTM-97AT	Top	B			
LTM-97BS	Side	C	Vout	Vcc	Gnd
LTM-97BT	Top	D			
LTM-97CS	Side	C	Gnd	Vout	Vcc
LTM-97CT	Top	D			
LTM-97DS	Side	C	Gnd	Vcc	Vout
LTM-97DT	Top	D			

Package Dimensions

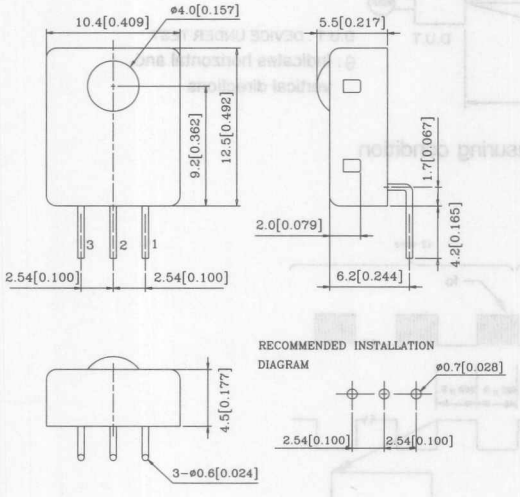
A. LTM-97AS-XX



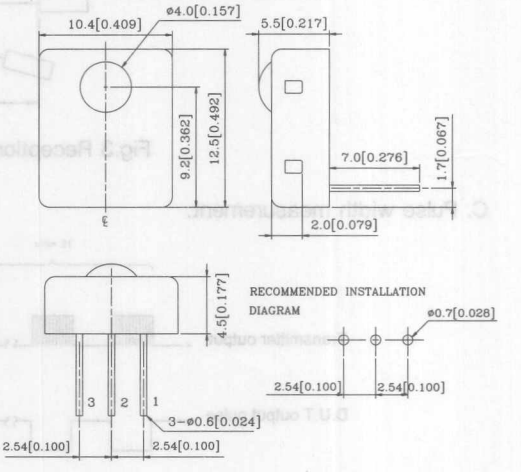
B. LTM-97AT-XX



C. LTM-97BS/CS/DS-XX



D. LTM-97BT/CT/DT-XX



Notes:1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. XX:Frequency.

Measuring Method

A. Standard transmitter:

The transmitter whose output is adjusted up become Vo=400mVp-p by output waveform as shown in Fig. 1 and the measuring method as shown in Fig. 2 is specified as the standard transmitter. However, the infrared diode to be used for the transmitter should be λp=940nm, $\triangle \lambda$ =50nm.

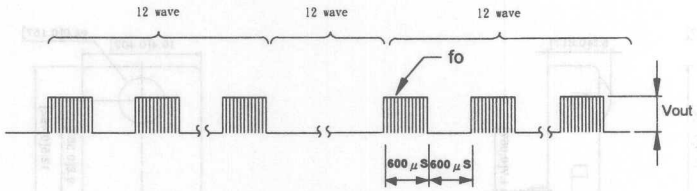


Fig.1 Output Waveform

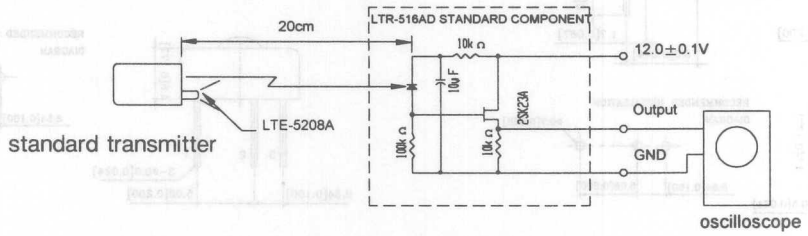


Fig.2 Measuring method

B. Reception distance measurement.

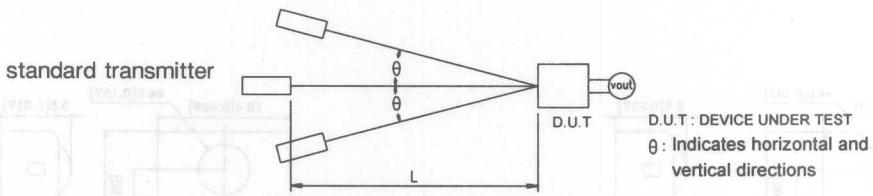


Fig.3 Reception distance measuring condition

C. Pulse width measurement.

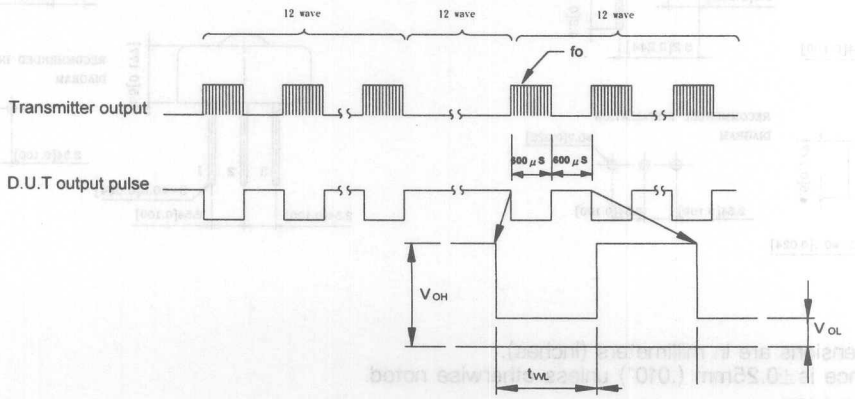


Fig.4 Output pulse

Available Types For Different Carrier Frequencies

Carrier Frequency	Device No.
33 KHZ	LTM-97XX-33
36 KHZ	LTM-97XX-36
38 KHZ	LTM-97XX-38
40 KHZ	LTM-97XX-40
56.8 KHZ	LTM-97XX-56

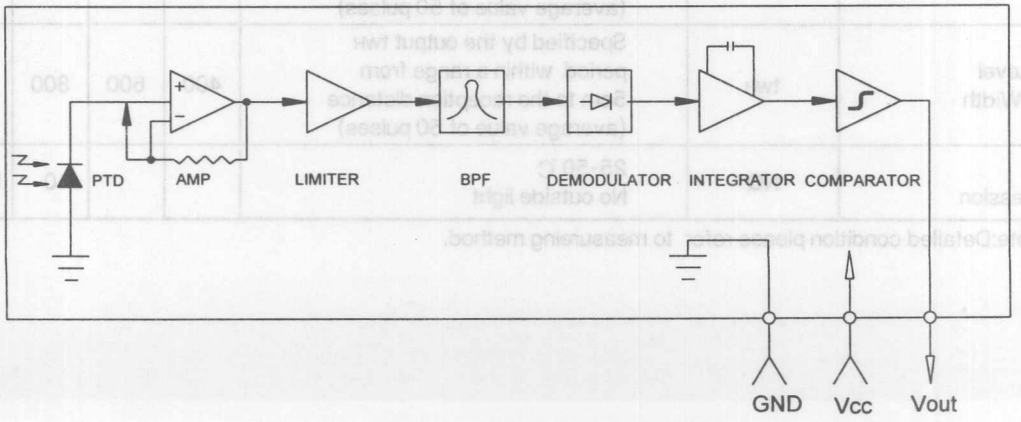
Absolute Maximum Ratings (Ta=25 ℃)

Parameter	Symbol	Rating	Unit
Supply Voltage	Vcc	6.0	V
Output Current	Iout	2.5	mA
Operating Temperature	Topr	-20 ~ +70	℃
Storage Temperature	Tstg	-25 ~ +85	℃
Soldering Temperature	Tsd	260	℃

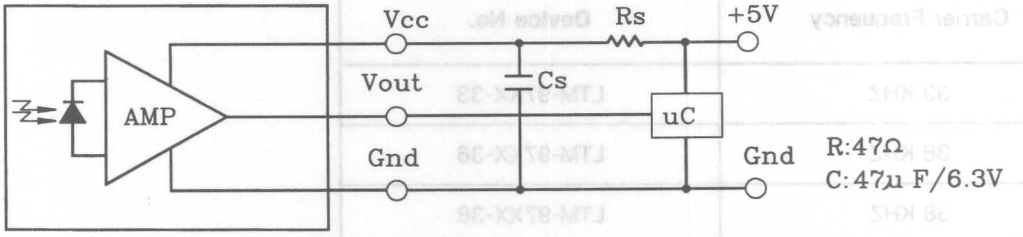
Recommended Operating Condition

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	4.7	5.3	V

Block Diagram



Application Circuit



•Rs and Cs is only necessary to suppress power supply disturbances

Electrical Characteristics

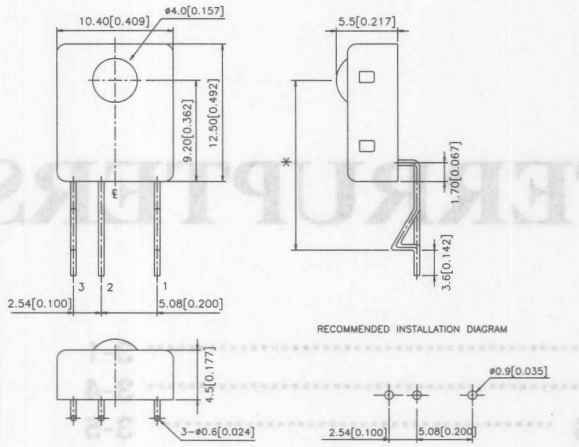
Item	Symbol	Conditions	Rating			Unit
			Min	Typ	Max	
Current Consumption	Icc	No signal input	1.1		2.5	mA
Reception Distance	L	At the ray axis	10			m
		The ray receiving surface at a vertex and in relation to the ray axis: a: in the range of 30° cone b: in the range of 45° cone	 8 6			
Low Level Output Voltage	VOL	30cm over the ray axis			0.5	V
High Level Output Voltage	VOH	30cm over the ray axis	4.5			V
Low Level Pulse Width	tWL	Specified by the output tWL period within a range from 5cm to the reception distance (average value of 50 pulses)	400	600	800	μS
High Level Pulse Width	tWH	Specified by the output tWH period within a range from 5cm to the reception distance (average value of 50 pulses)	400	600	800	μS
Noise Suppression	NQ	25-50℃ No outside light			0	Pulse

Note:Detailed condition please refer to measureing method.

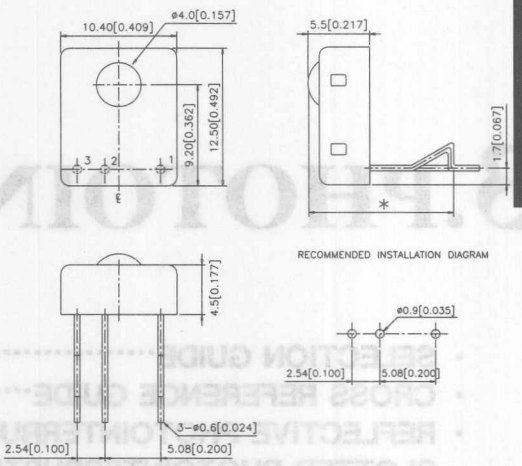
Special Forming (Option)

- We provide lead forming service if it's necessary.
- " * " Dimension can be changed according to customer's requirement.

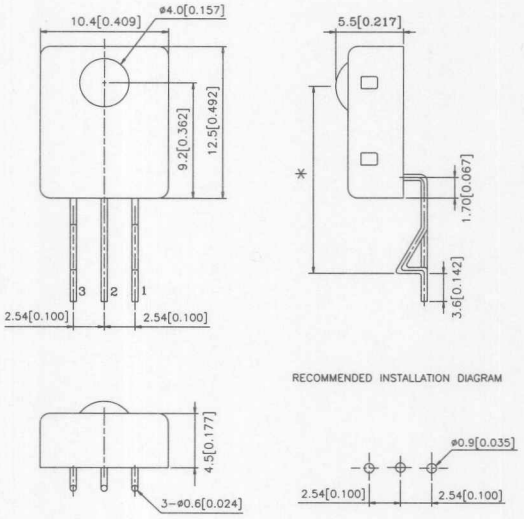
A. LTM-97AS-XX#



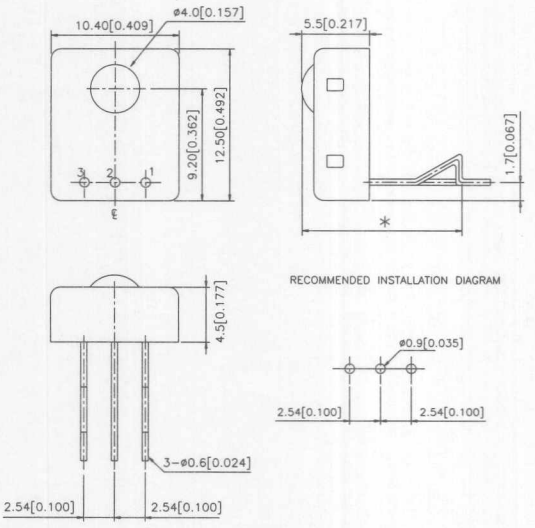
B. LTM-97AT-XX#



C. LTM-97BS/CS/DS-XX#



D. LTM-97BT/CT/DT-XX#



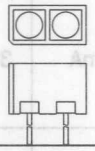
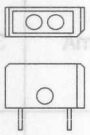
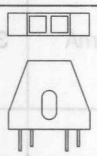
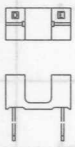
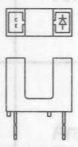
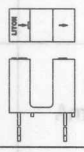
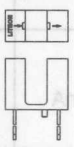
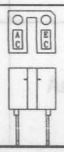
Notes:1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. XX:Frequency.
4. # for special request.

3. PHOTOINTERRUPTERS

- SELECTION GUIDE 3-1
- CROSS REFERENCE GUIDE 3-4
- REFLECTIVE PHOTOINTERRUPTERS 3-5
- SLOTTED PHOTOINTERRUPTERS 3-10
- ACTUATOR PHOTOINTERRUPTERS 3-27

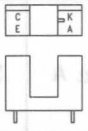
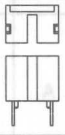
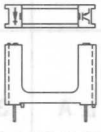
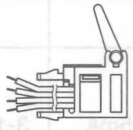
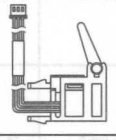
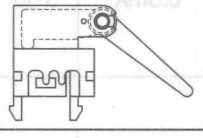
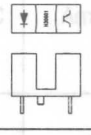
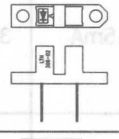
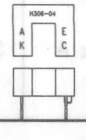
Selection Guide

· Photointerrupters

Outline	Device		Ired V_F Typ. @I_F=20mA	Sensor V_{CEO} Min. @I_C=20mA	Sensor V_{CEO} Min. @I_E=100 μ A	I_C Min. @I_F=20mA/ V_{CE}=5V	Page No.
	Package	Part No.					
	Reflective Type	LTH-1550-01	1.2V	30V	5V	200 μ A	3-5
	Reflective Type	LTH-1650-01	1.2V	30V	5V	100 μ A	3-5
	Reflective Type	LTH-209-01	1.2V	30V	5V	200 μ A	3-5
	Slotted Type	LTH-301A	1.2V	30V	5V	0.5mA	3-10
	Slotted Type	LTH-301-05	1.2V	30V	5V	0.5mA	3-10
	Slotted Type	LTH-301-07	1.2V	30V	5V	0.4mA	3-10
	Slotted Type	LTH-301-19	1.2V	30V	5V	1.5mA	3-10
	Slotted Type	LTH-301-20	1.2V	30V	5V	70 μ A	3-16

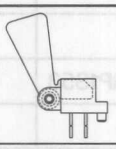
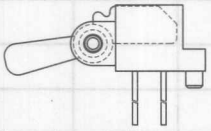
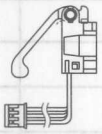
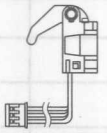
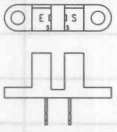
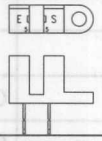
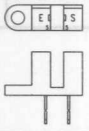
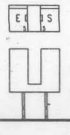
Selection Guide

· Photointerrupters

Outline	Device		Ired V_F Typ. @I_F=20mA	Sensor V_{CEO} Min. @I_C=20mA	Sensor V_{CEO} Min. @I_E=100 μ A	I_C Min. @I_F=20mA/ V_{CE}=5V	Page No.
	Package	Part No.					
	Slotted Type	LTH-301-23	1.2V	30V	5V	0.4mA	3-10
	Slotted Type	LTH-301-24	1.2V	30V	5V	0.7mA	3-16
	Slotted Type	LTH-301-32	1.2V	30V	5V	0.4mA	3-10
	Actuator Type	LTH-301-25W1	1.2V	30V	5V	0.5mA	3-30
	Actuator Type	LTH-301-25W2	1.2V	30V	5V	0.5mA	3-30
	Actuator Type	LTH-301-26W1	1.2V	30V	5V	0.5mA	3-30
	Slotted Type	LTH-306-01	1.2V	30V	5V	5.0mA	3-10
	Slotted Type	LTH-306-02	1.2V	30V	5V	0.5mA	3-10
	Slotted Type	LTH-306-04	1.2V	30V	5V	0.5mA	3-16

Selection Guide

· Photointerrupters

Outline	Device		Ired V_F Typ. @I_F=20mA	Sensor V_{CEO} Min. @I_C=20mA	Sensor V_{CEO} Min. @I_E=100 μ A	I_C Min. @I_F=20mA/ V_{CE}=5V	Page No.
	Package	Part No.					
	Actuator Type	LTH-306-08	1.2V	30V	5V	0.5mA	3-27
	Actuator Type	LTH-306-09	1.2V	30V	5V	0.5mA	3-27
	Actuator Type	LTH-306-03W1	1.2V	30V	5V	0.5mA	3-30
	Actuator Type	LTH-306-06W1	1.2V	30V	5V	0.5mA	3-30
	Actuator Type	LTH-306-07W1	1.2V	30V	5V	0.5mA	3-30
	Slotted Type	LTH-860T LTH-870T	1.2V	30V	5V	Parameter A @I_F=20mA V_{CE}=10V	3-21
						0.5mA	
	Slotted Type	LTH-860P LTH-870P				Parameter A @I_F=20mA V_{CE}=10V	
						0.5mA	
	Slotted Type	LTH-860L LTH-870L				Parameter C @I_F=20mA V_{CE}=10V	
						0.5mA	
	Slotted Type	LTH-860N LTH-870N					

Cross Reference Guide

· Photointerrupters

LITON Part No.	ALEPH Part No.	HONEYWELL Part No.	KODENSHI Part No.	OMRON Part No.	OPTEK Part No.	ROHM Part No.	SHARP Part No.	TRW Part No.
LTH-1550-01						RPR359F		
LTH-1650-01	OS-2016							
LTH-209-01		HOA708	PG-7L3		OPB708			
LTH-301-23							GP1S53	
LTH-301-25W1					OPB850			
LTH-301-26W1	OS-570203-613A							
LTH-301-26W2	OS-570203-605							
LTH-301-32				EE-SX1042				
LTH-301-33			SG-23FH					
LTH-306-01				EE-SX1025				
LTH-306-02							GP1S50	
LTH-306-03W1						SIU-5000		
LTH-306-03W4						SIU-500X		
LTH-306-03W5						SIU-500X		
LTH-306-03W6						SIU-500X		
LTH-306-03W7						SIU-500X		
LTH-306-04	OS-3316							
LTH-306-05W3			SG-406					
LTH-306-06W1	OS-560203-644							
LTH-306-07W1	OS-560203-636A							
LTH-306-08	OS-110703-304							
LTH-306-09	OS-110703-308							
LTH-860		HOAO860			OPB-860			OPB-860
LTH-870		HOAO870			OPB-870			OPB-870

LITEON

Reflective Photointerrupters

LTH-209-01/LTH-1550-01/LTH-1650-01

Features

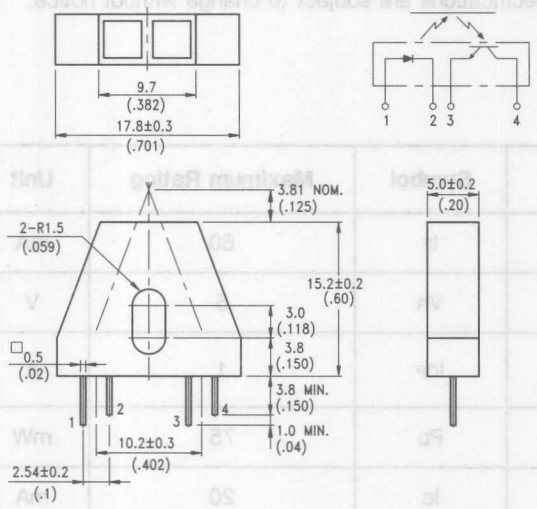
- Non-contact switching.
- For direct PC board or dual-in-line socket mounting.
- Fast switching speed.
- Reflective object sensor.

Description

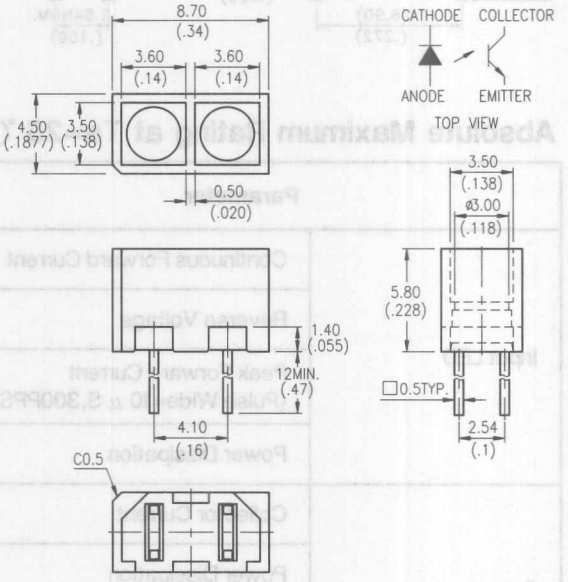
The LTH-209-01/LTH-1550-01/LTH-1650-01 reflective object sensors consist of an infrared emitting diode and a NPN sillicon phototransistor mounted side by side on converging optical axis in a black plastic housing.

Package Dimensions

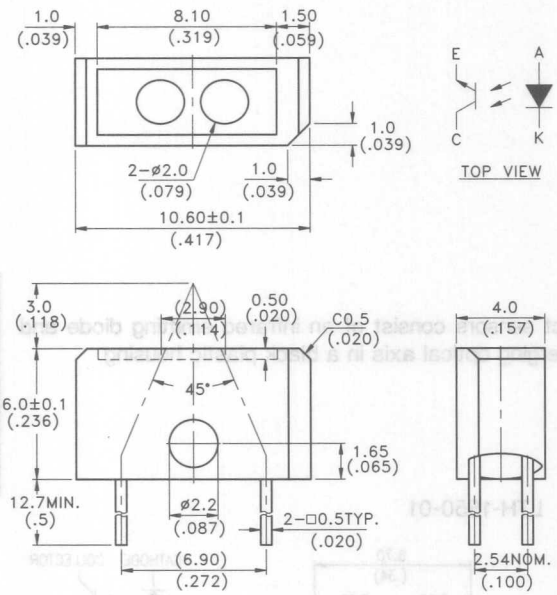
LTH-209-01



LTH-1550-01



LTH-1650-01



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25 mm (.010").
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

Absolute Maximum Rating at Ta=25 ℃

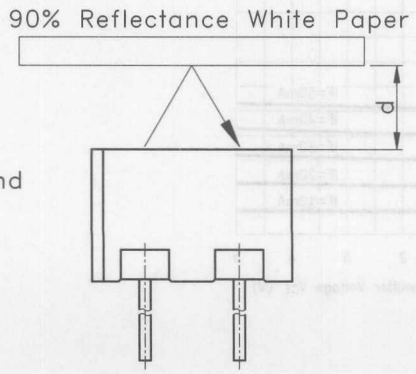
Parameter		Symbol	Maximum Rating	Unit
Input LED	Continuous Forward Current	I_F	60	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current (Pulse Wide=10 μ S,300PPS)	I_{CP}	1	A
	Power Dissipation	P_D	75	mW
Output Phototransistor	Collector Current	I_C	20	mA
	Power Dissipation	P_C	100	mW
	Collector-emitter Voltage	V_{CEO}	30	V
	Emitter-collector Voltage	V_{ECO}	5	V
Operating Temperature Range		T_{opr}	-25 ℃ to 85 ℃	
Storage Temperature Range		T_{stg}	-40 ℃ to 100 ℃	
Lead Soldering Temperature [1.6mm(.063 in.) from body]		T_S	260 ℃ for 5 seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter		Symbol	Part No.	Min.	Typ.	Max.	Unit	Test Condition	Bin No.
Input LED									
Forward Voltage		V_F			1.2	1.6	V	I_F=20mA	
Reverse Current		I_R				100	μA	V_R=5V	
Output Phototransistor									
Collector-emitter Breakdown Voltage		BV_{CEO}		30			V	I_C=1mA	
Emitter-collector Breakdown Voltage		BV_{ECO}		5			V	I_E=0.1mA	
Collector Dark Current		I_{CEO}				100	nA	V_{CE}=10V	
Coupler									
Collector-emitter Saturation Voltage		$V_{CE(sat)}$	LTH-209-01			0.4	V	I_C=0.16mA,I_F=20mA	
			LTH-1550-01			0.4		I_C=0.2mA,I_F=20mA	
			LTH-1650-01			0.4		I_C=0.1mA,I_F=20mA	
On State Collector Current		$I_{C(ON)}$	LTH-209-01	160	400		μA	NOTE1	
			LTH-1550-01	200		400		NOTE2	BIN A
				300		600			BIN B
				500		1000			BIN C
				800		1600			BIN D
			LTH-1650-01	100		300		NOTE3	BIN A
				200		600			BIN B
				400		1200			BIN C
Response Time	Rise Time	t_r			3	15	μS	V_{CE}=5V,I_C=2mA R_L=100 Ω	
	Fall Time	t_f			4	20			

NOTE1: V_{CE}=5V, I_F=20mA, d=3.81MM, 90% Reflectance White Paper
NOTE2: V_{CE}=5V, I_F=20mA, d=3.50MM, 90% Reflectance White Paper
NOTE3: V_{CE}=5V, I_F=20mA, d=3.00MM, 90% Reflectance White Paper

Test Condition and Arrangement for Collector Current



Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.1 Power Dissipation vs. Ambient Temperature

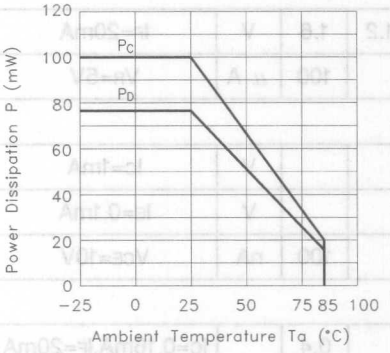


Fig.2 Forward Current vs. Forward Voltage

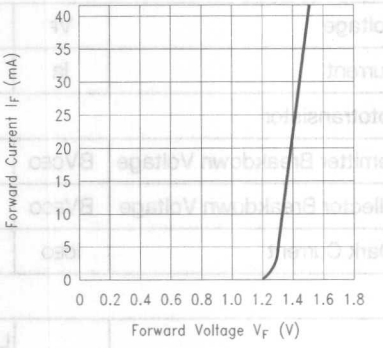


Fig.3 Collector Current vs. Collector-emitter Voltage

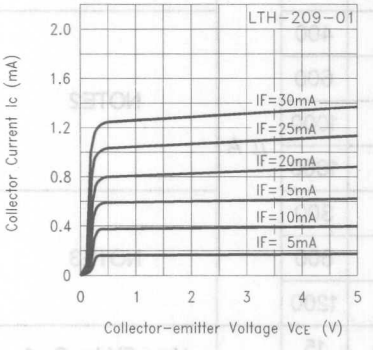


Fig.4 Collector Current vs. Collector-emitter Voltage

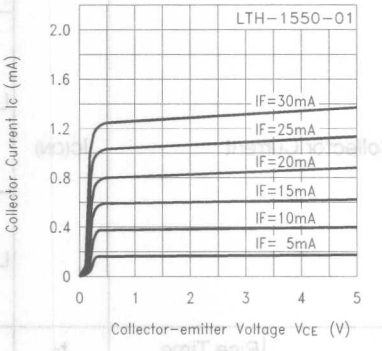


Fig.5 Collector Current vs. Collector-emitter Voltage

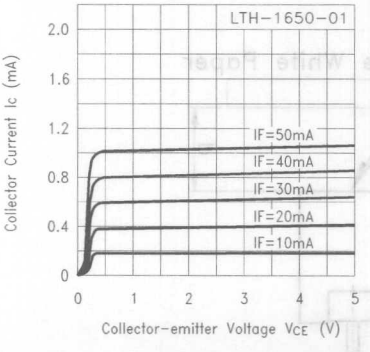
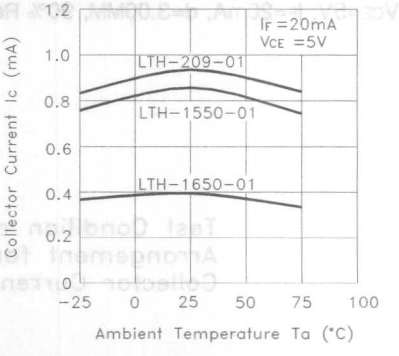


Fig.6 Collector Current vs. Ambient Temperature



Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.7 Collector-emtter Saturation vs. Voltage Ambient Temperature

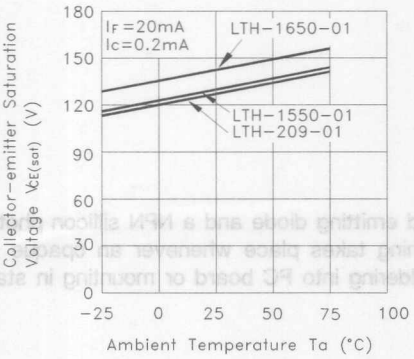


Fig.8 Relative Collector Current vs. Object Distance

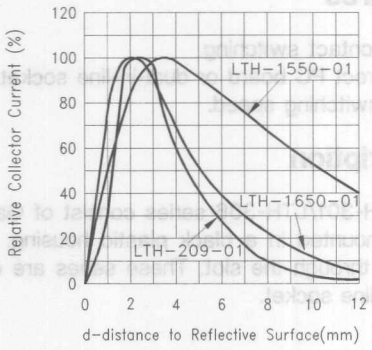
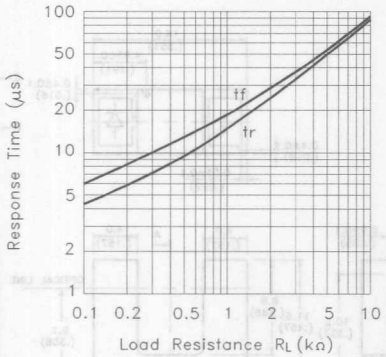
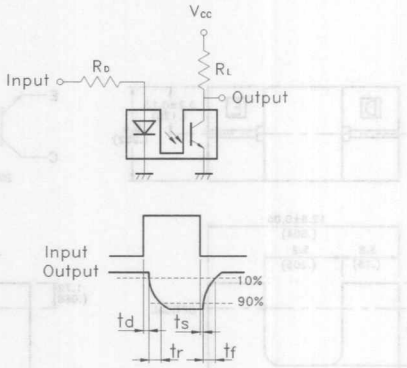


Fig.9 Response Time vs. Load Resistance



Test Circuit for Response Time



PHOTOINTERRUPTERS

LITEON

Slotted Photointerrupters

LTH-301A/LTH-301-05/LTH-301-07/LTH-301-19
LTH-301-23/LTH-301-32/LTH-306-01/LTH-306-02

Features

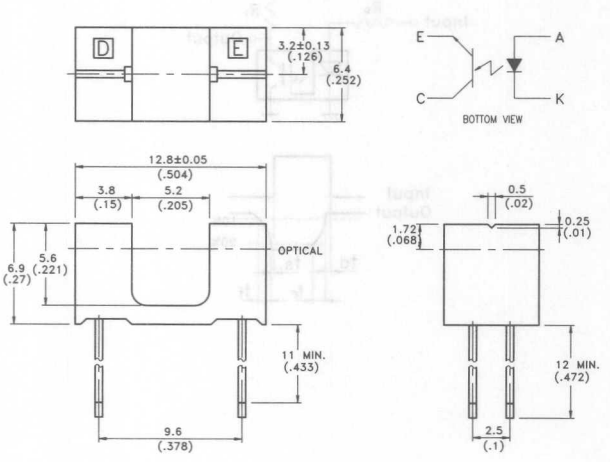
- Non-contact switching.
- For direct PC board or dual-in-line socket mounting.
- Fast switching speed.

Description

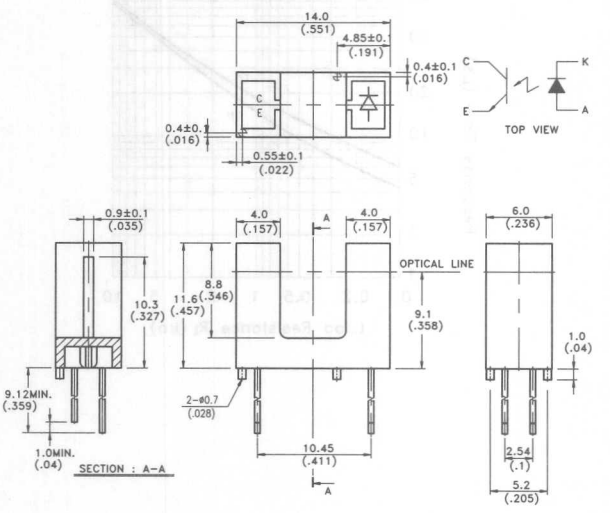
The LTH-301/LTH-306 series consist of Gallium Arsenide infrared emitting diode and a NPN sillicon phototransistor mounted in a black plastic housing. Phototransistor switching takes place whenever an opaque object passes through the slot. These series are designed for direct soldering into PC board or mounting in standard dual-in-line socket.

Package Dimensions

LTH-301A

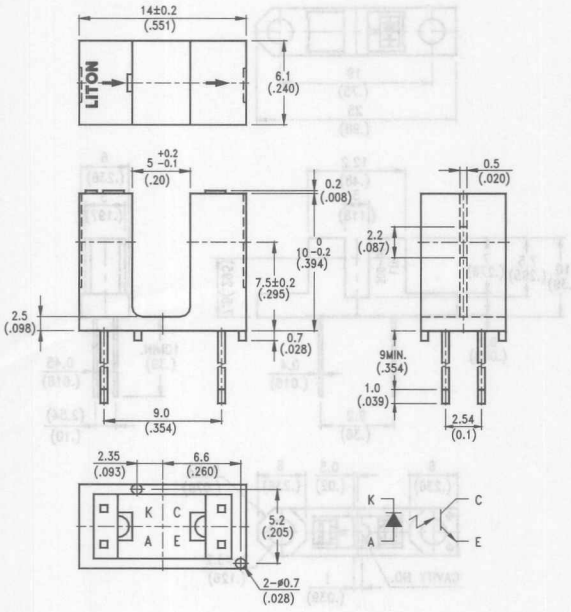


LTH-301-05

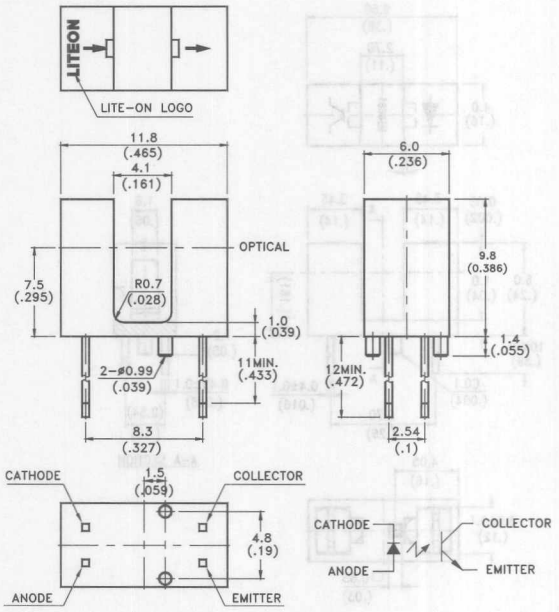


Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25 mm (.010").
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

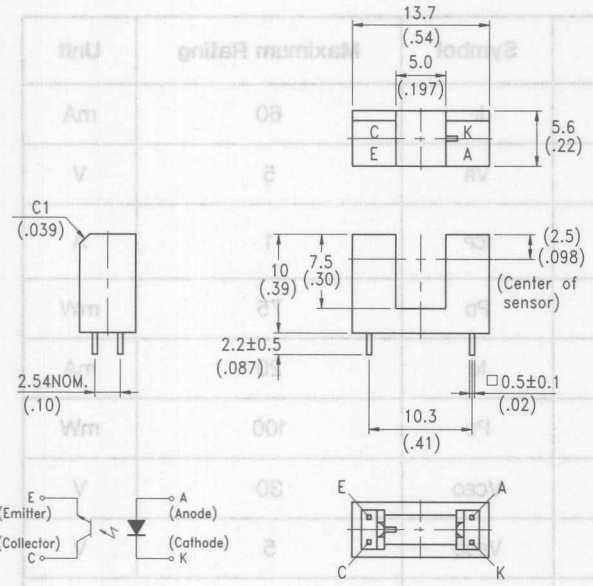
LTH-301-07



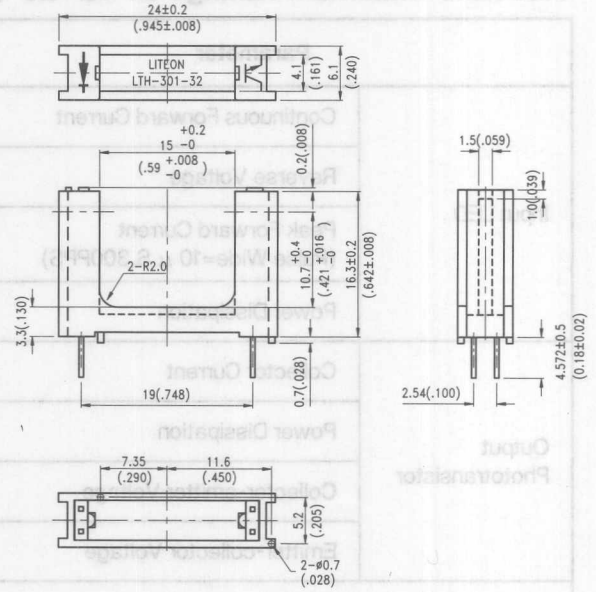
LTH-301-19



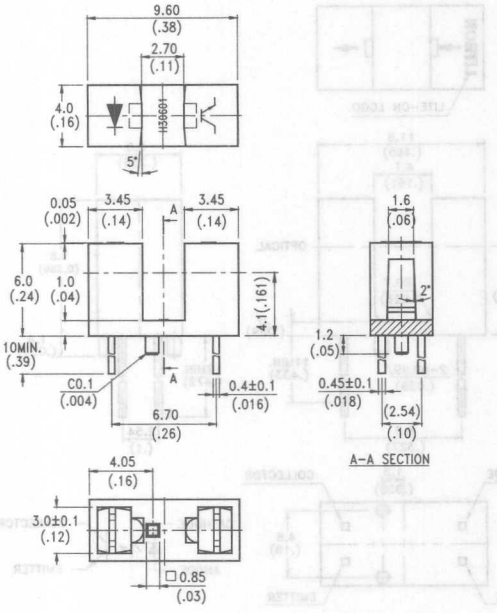
LTH-301-23



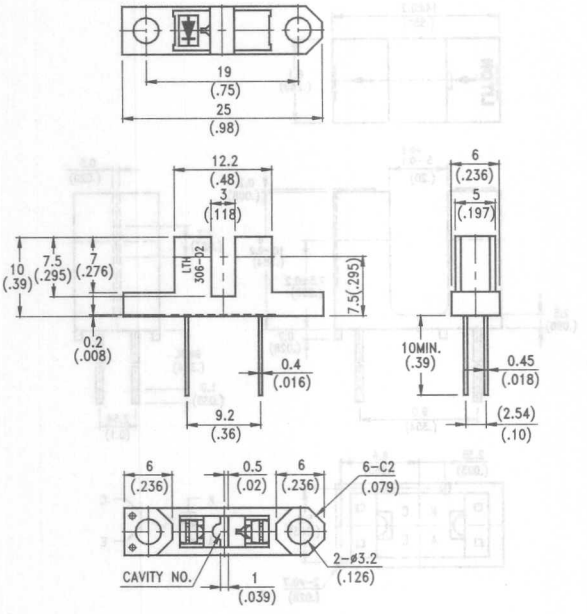
LTH-301-32



LTH-306-01



LTH-306-02



Absolute Maximum Ratings at Ta=25 ℃

Parameter		Symbol	Maximum Rating	Unit
Input LED	Continuous Forward Current	I_F	60	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current (Pulse Wide=10 μ S,300PPS)	I_{CP}	1	A
	Power Dissipation	P_D	75	mW
Output Phototransistor	Collector Current	I_C	20	mA
	Power Dissipation	P_C	100	mW
	Collector-emitter Voltage	V_{CEO}	30	V
	Emitter-collector Voltage	V_{ECO}	5	V
Operating Temperature Range		T_{opr}	-25 ℃ to 85 ℃	
Storage Temperature Range		T_{stg}	-40 ℃ to 100 ℃	
Lead Soldering Temperature [1.6mm(.063 in.) from body]		T_S	260 ℃ for 5 seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter		Symbol	Part No.	Min.	Typ.	Max.	Unit	Test Condition
Input LED								
Forward Voltage		V_F			1.2	1.6	V	I_F=20mA
Reverse Current		I_R				100	μA	V_R=5V
Output Phototransistor								
Collector-emitter Breakdown Voltage		BV_{CEO}		30			V	I_C=1mA
Emitter-collector Breakdown Voltage		BV_{ECO}		5			V	I_E=0.1mA
Collector Dark Current		I_{CEO}				100	nA	V_{CE}=10V
Coupler								
Collector-emitter Saturation Voltage		$V_{CE(sat)}$	LTH-301A			0.4	V	I_C=0.5mA,I_F=20mA
			LTH-301-05			0.4		I_C=0.5mA,I_F=20mA
			LTH-301-07			0.4		I_C=0.5mA,I_F=20mA
			LTH-301-19			0.4		I_C=1.5mA,I_F=20mA
			LTH-301-23			0.4		I_C=0.4mA,I_F=20mA
			LTH-301-32			0.4		I_C=0.4mA,I_F=20mA
			LTH-306-01			0.4		I_C=5.0mA,I_F=20mA
			LTH-306-02			0.4		I_C=0.5mA,I_F=20mA
On State Collector Current		$I_{C(ON)}$	LTH-301A	0.5			mA	V_{CE}=5V,I_F=20mA
			LTH-301-05	0.5				
			LTH-301-07	0.4				
			LTH-301-19	1.5				
			LTH-301-23	0.4				
			LTH-301-32	0.4				
			LTH-306-01	5.0				
			LTH-306-02	0.5				
Response Time	Rise Time	t_r			3	15	μS	V_{CE}=5V,I_C=2mA R_L=100 Ω
	Fall Time	t_f			4	20		

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.1 Power Dissipation vs. Ambient Temperature

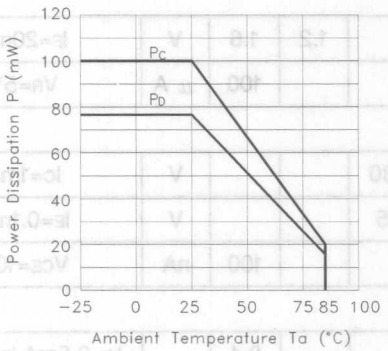


Fig.2 Forward Current vs. Forward Voltage

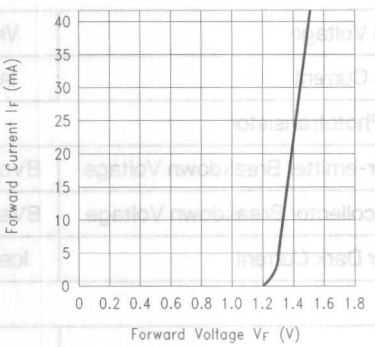


Fig.3 Collector Current vs. Collector−emitter Voltage

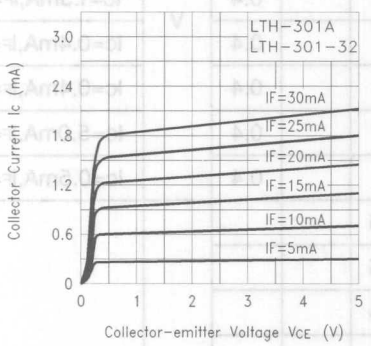


Fig.4 Collector Current vs. Collector−emitter Voltage

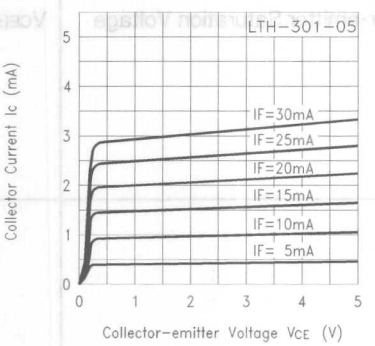


Fig.5 Collector Current vs. Collector−emitter Voltage

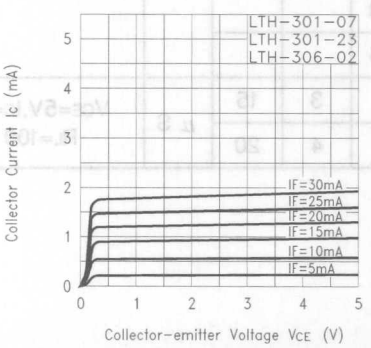
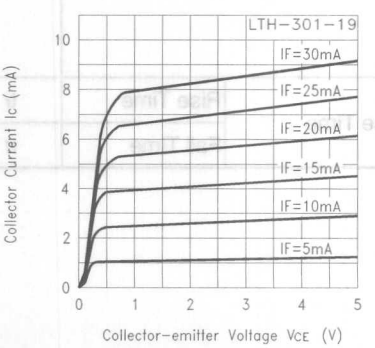


Fig.6 Collector Current vs. Collector−emitter Voltage



Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.7 Collector Current vs. Collector-emitter Voltage

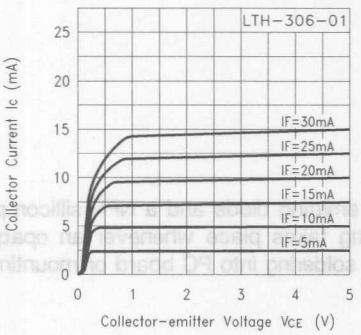


Fig.8 Collector Current vs. Ambient Temperature

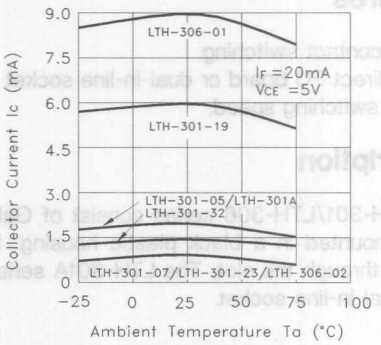


Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature

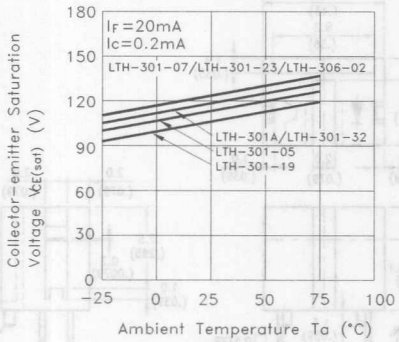
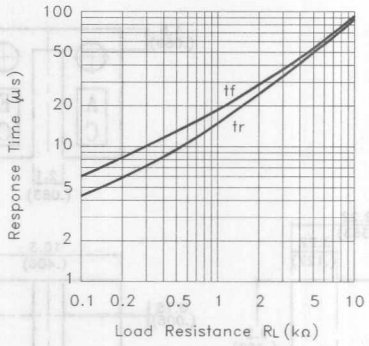
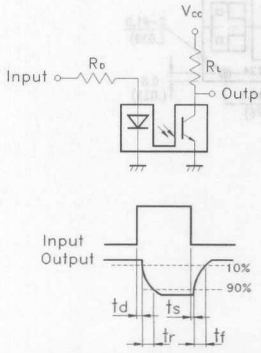


Fig.10 Response Time vs. Load Resistance



Test Circuit for Response Time



PHOTOINTERRUPTERS

LITEON

Slotted Photointerrupters

LTH-301-20/LTH-301-24/LTH-306-04

Features

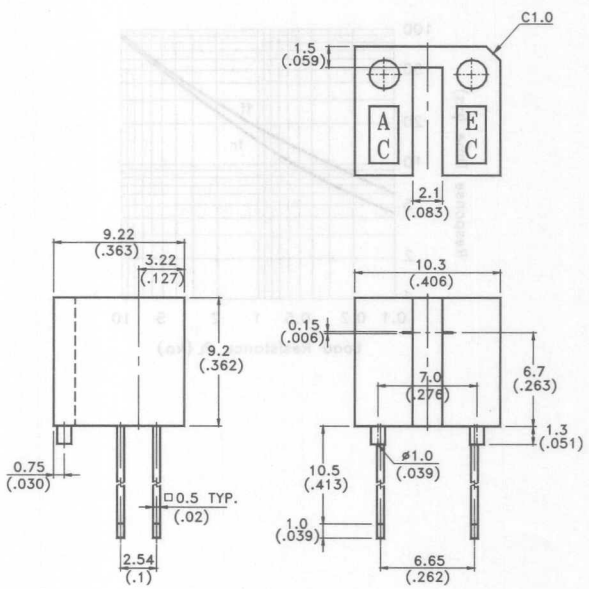
- Non-contact switching.
- For direct PC board or dual-in-line socket mounting.
- Fast switching speed.

Description

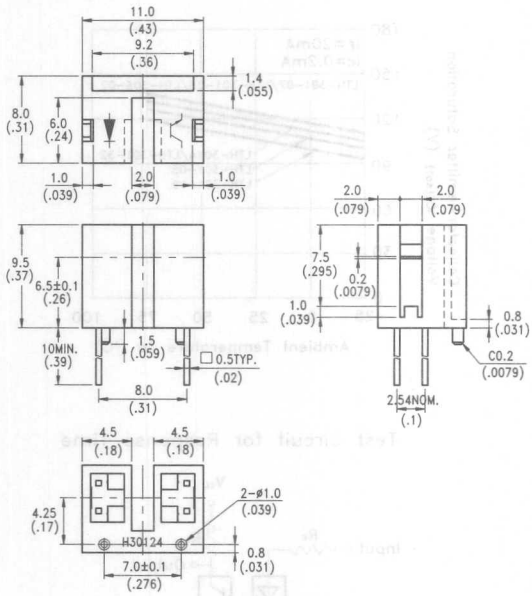
The LTH-301/LTH-306 series consist of Gallium Arsenide infrared emitting diode and a NPN sillicon phototransistor mounted in a black plastic housing. Phototransistor switching takes place whenever an opaque object passes through the slot. The LTH-301A serie is designed for direct soldering into PC board or mounting in standard dual-in-line socket.

Package Dimensions

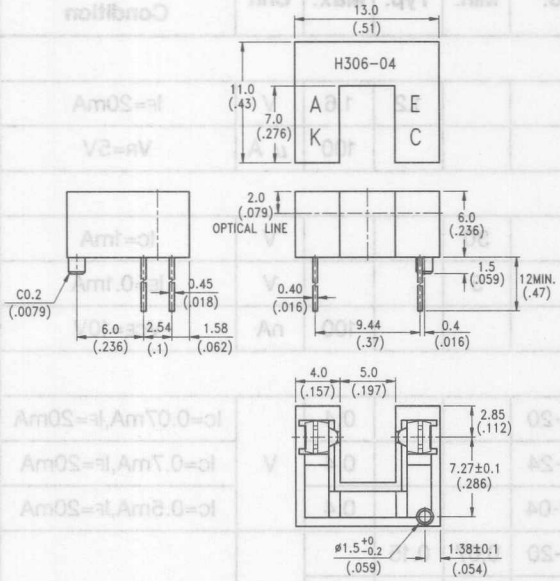
LTH-301-20



LTH-301-24



LTH-306-04



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25 mm (.010").
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter		Symbol	Maximum Rating	Unit
Input LED	Continuous Forward Current	I_F	60	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current (Pulse Wide=10 μ S,300PPS)	I_{CP}	1	A
	Power Dissipation	P_D	75	mW
Output Phototransistor	Collector Current	I_C	20	mA
	Power Dissipation	P_C	100	mW
	Collector-emitter Voltage	V_{CEO}	30	V
	Emitter-collector Voltage	V_{ECO}	5	V
Operating Temperature Range		T_{opr}	-25 ℃ to 85 ℃	
Storage Temperature Range		T_{stg}	-40 ℃ to 100 ℃	
Lead Soldering Temperature [1.6mm(.063 in.) from body]		T_S	260 ℃ for 5 seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter		Symbol	Part No.	Min.	Typ.	Max.	Unit	Test Condition
Input LED								
Forward Voltage		V_F			1.2	1.6	V	I_F=20mA
Reverse Current		I_R				100	μA	V_R=5V
Output Phototransistor								
Collector-emitter Breakdown Voltage		BV_{CEO}		30			V	I_C=1mA
Emitter-collector Breakdown Voltage		BV_{ECO}		5			V	I_E=0.1mA
Collector Dark Current		I_{CEO}				100	nA	V_{CE}=10V
Coupler								
Collector-emitter Saturation Voltage		$V_{CE(sat)}$	LTH-301-20			0.4	V	I_C=0.07mA,I_F=20mA
			LTH-301-24			0.4		I_C=0.7mA,I_F=20mA
			LTH-306-04			0.4		I_C=0.5mA,I_F=20mA
On State Collector Current		$I_{C(ON)}$	LTH-301-20	0.07	0.15		mA	V_{CE}=5V,I_F=20mA
			LTH-301-24	0.7		20		
			LTH-306-04	0.5	2			
Response Time	Rise Time	t_r			3	15	μS	V_{CE}=5V,I_C=2mA R_L=100 Ω
	Fall Time	t_f			4	20		

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.1 Power Dissipation vs. Ambient Temperature

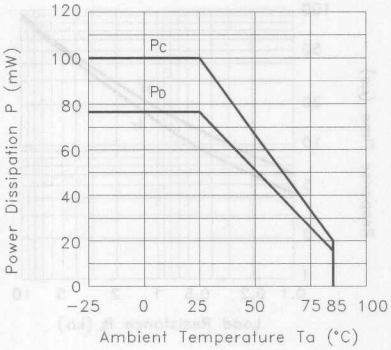


Fig.2 Forward Current vs. Forward Voltage

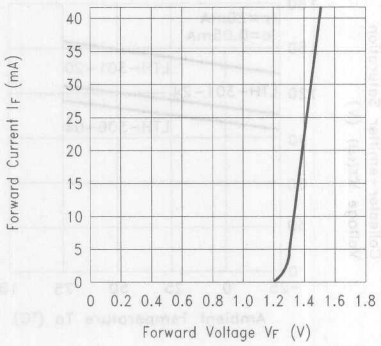


Fig.3 Collector Current vs. Collector−emitter Voltage

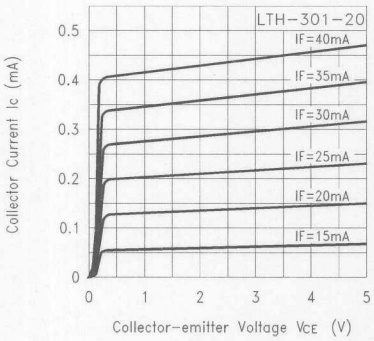


Fig.4 Collector Current vs. Collector−emitter Voltage

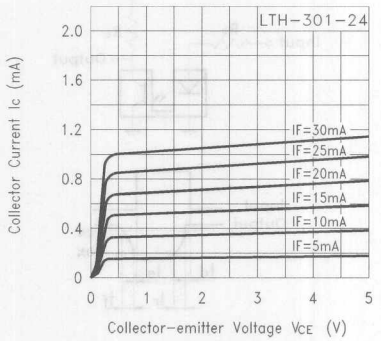


Fig.5 Collector Current vs. Collector−emitter Voltage

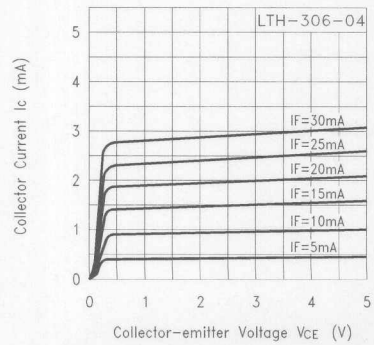
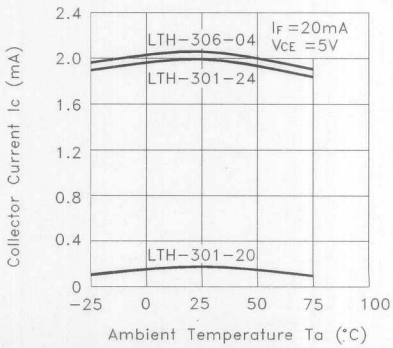


Fig.6 Collector Current vs. Ambient Temperature



Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.7 Collector-emitter Saturation Voltage vs. Ambient Temperature

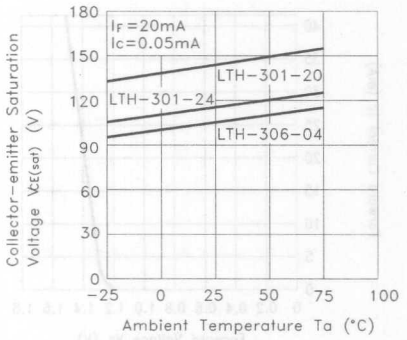
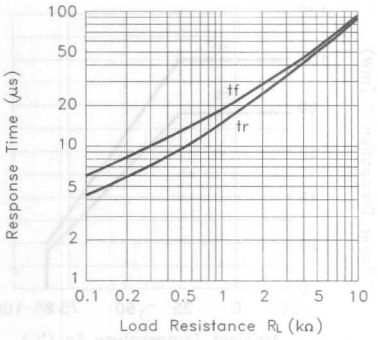
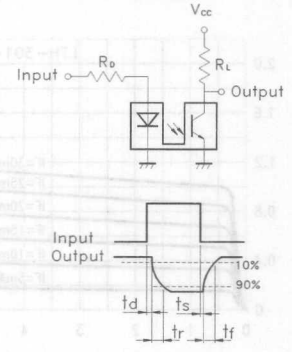


Fig.8 Response Time vs. Load Resistance



Test Circuit for Response Time



LITEON

Slotted Photointerrupters

LTH-860/LTH-870

Features

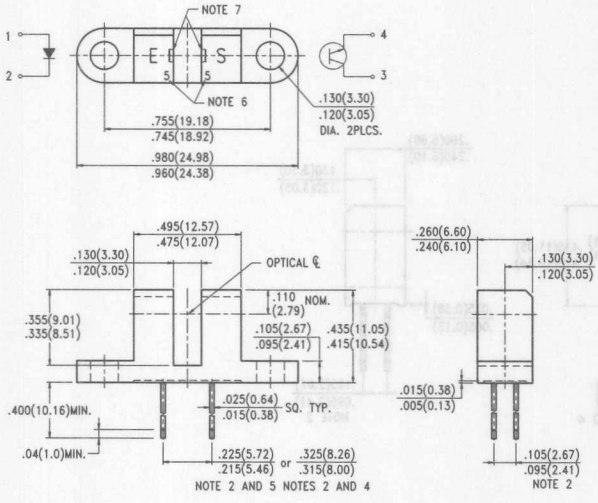
- Non-contact switching.
- Fast switching speed.
- For direct PC board or dual-in-line socket mounting.
- Choice of mounting configuraton.

Description

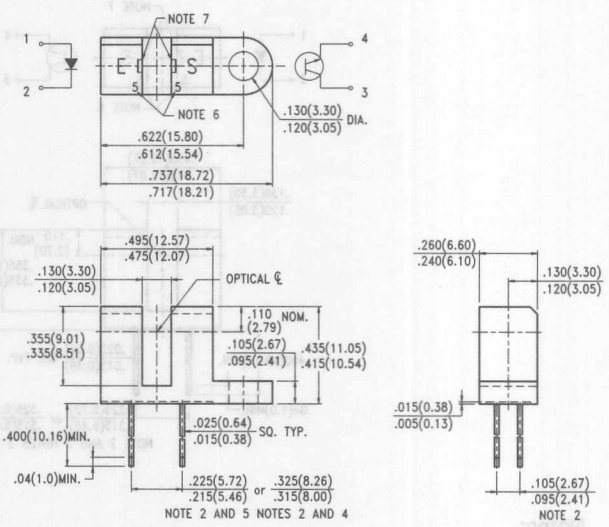
The LTH-860/LTH-870 series provide the design engineer with the flexibility of a custom device from a standard product line. The user can specify (1) electrical output parameters, (2) mounting tab configuration, (3) choice of lead spacing, (4) discret shell material and (5) aperture width. All housings are an opaque grade of injection-molded polysulfone to minimize the assembly's sensitivity to ambient radiation, both visible and near-infrared.

Package Dimensions

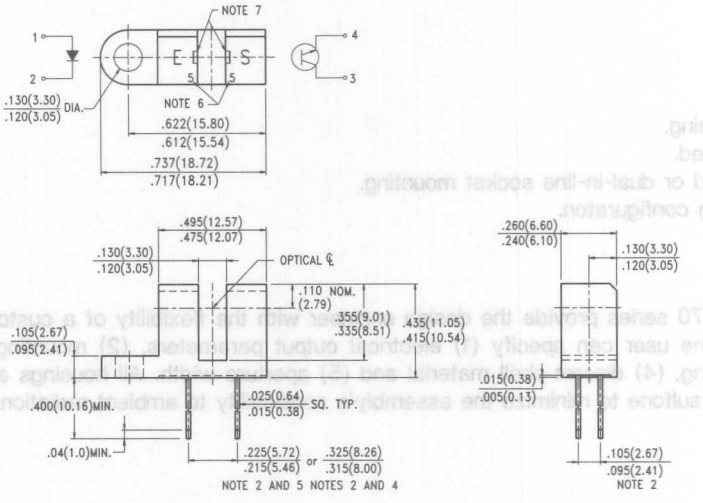
Package Configuration T



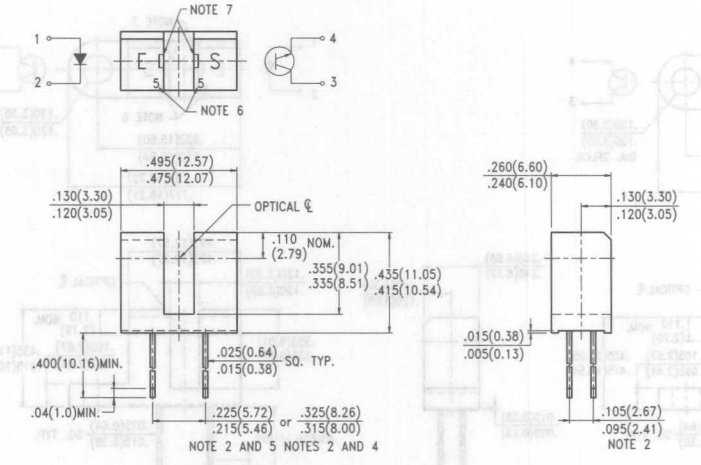
Package Configuration P



Package Configuration L



Package Configuration N



Notes:

1.All dimensions are in inches (millmeters).
2.Dimension controlled at housing surface only.
3.Housing is soluble in chlorinated hydrocarbons and ketones.
Recommended cleaning agents are Methanol and Isopropanol.
4.LTH-860, LTH-861, LTH-862, LTH-870, LTH-871, LTH-872.
5.LTH-865, LTH-866, LTH-867, LTH-875, LTH-876, LTH-877.
6.Molded number to identify aperature size. See part number guide.
7.Dimensions of aperature opening dependent on housing material. See part number guide.
8.Housing shown are opaque polysulfone.

Part Numbering Guide

LTH - 8 X X - X X X

Basic Part Number

Housing Material
6=Polysulfone,IR Transmissive
7=Polysulfone,Opaque

Mechanical and Electrical Spec.
0=Electrical Parameter A
Lead Spacing :.320 in.(8.13mm)
1=Electrical Parameter B
Lead Spacing :.320 in.(8.13mm)
2=Electrical Parameter C
Lead Spacing :.320 in.(8.13mm)
5=Electrical Parameter A
Lead Spacing :.220 in.(5.59mm)
6=Electrical Parameter B
Lead Spacing :.220 in.(5.59mm)
7=Electrical Parameter C
Lead Spacing :.220 in.(5.59mm)

Aperture Width in front of Sensor (5)
5=.050 in.(1.27mm)
*1=.010 in.(.25mm)
Aperture Lengths are 0.06 in.(1.52mm)
*Available with Parameter A only

Aperture Width in front of IRED (5)
5=.050 in.(1.27mm)

Mounting Configurations
T=Both Mounting Tabs.
P=Single Mounting Tabs, Sensor Side
L=Single Mounting Tabs, Emitter Side
N=No Mounting Tabs.

Absolute Maximum Ratings at Ta=25 ℃

Parameter		Symbol	Maximum Rating	Unit
Input LED	Continuous Forward Current	I_F	60	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current (Pulse Wide=10 μ S,300PPS)	I_{CP}	1	A
	Power Dissipation	P_D	75	mW
Output Phototransistor	Collector Current	I_C	20	mA
	Power Dissipation	P_C	100	mW
	Collector-emitter Voltage	V_{CEO}	30	V
	Emitter-collector Voltage	V_{ECO}	5	V
Operating Temperature Range		T_{opr}	-25 ℃ to 85 ℃	
Storage Temperature Range		T_{stg}	-40 ℃ to 100 ℃	
Lead Soldering Temperature [1.6mm(.063 in.) from body]		T_S	260 ℃ for 5 seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter		Symbol	Part No.	Min.	Typ.	Max.	Unit	Test Condition
Input LED								
Forward Voltage		V_F			1.2	1.6	V	I_F=20mA
Reverse Current		I_R				100	μA	V_R=5V
Output Phototransistor								
Collector-emitter Breakdown Voltage		BV_{CEO}		30			V	I_C=1mA
Emitter-collector Breakdown Voltage		BV_{ECO}		5			V	I_E=0.1mA
Collector Dark Current		I_{CEO}				100	nA	V_{CE}=10V
Coupler								
Collector-emitter Saturation Voltage	Parameter A	$V_{CE(sat)}$					V	I_C=0.5mA,I_F=20mA
	Parameter B					0.4		I_C=1.0mA,I_F=20mA
	Parameter C							I_C=1.8mA,I_F=20mA
On State Collector Current	Parameter A	$I_{C(ON)}$		0.5			mA	V_{CE}=5V,I_F=20mA
	Parameter B			1.0				
	Parameter C			1.8				
Response Time	Rise Time	t_r			3	15	μS	V_{CE}=5V,I_C=2mA R_L=100 Ω
	Fall Time	t_f			4	20		

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.1 Power Dissipation vs. Ambient Temperature

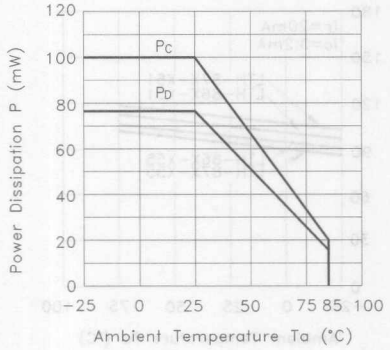


Fig.2 Forward Current vs. Forward Voltage

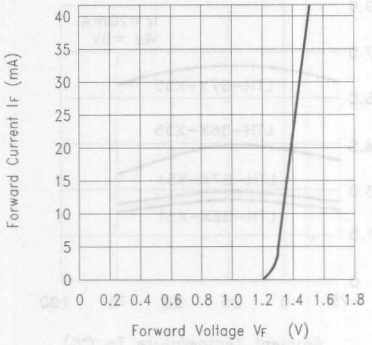


Fig.3 Collector Current vs. Collector-emitter Voltage

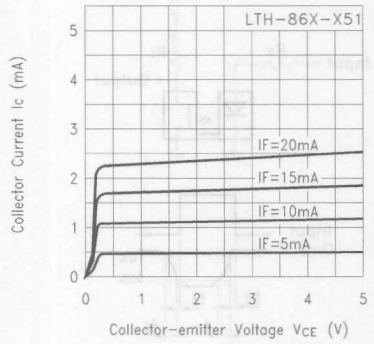


Fig.4 Collector Current vs. Collector-emitter Voltage

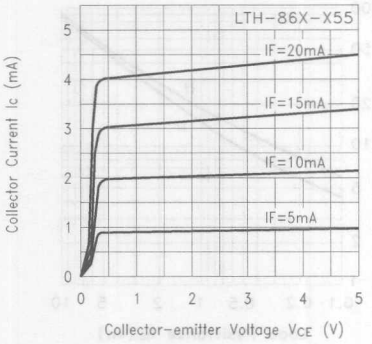


Fig.5 Collector Current vs. Collector-emitter Voltage

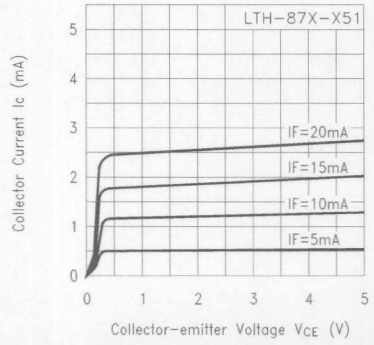
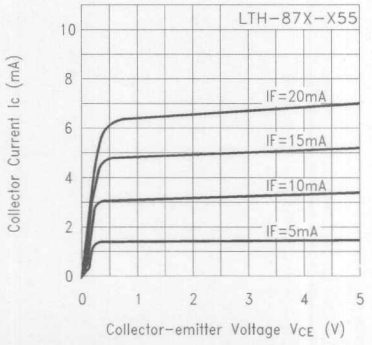


Fig.6 Collector Current vs. Collector-emitter Voltage



Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.7 Collector Current vs. Ambient Temperature

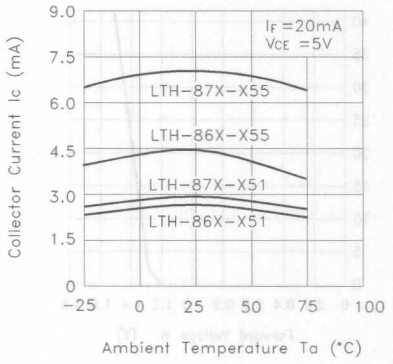


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

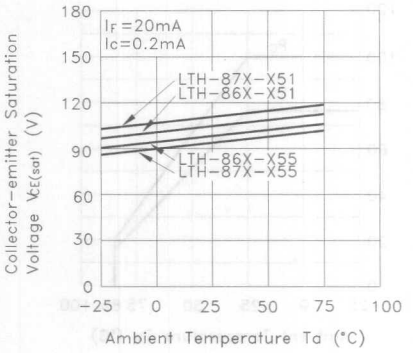
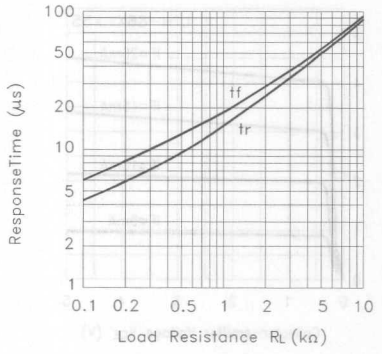
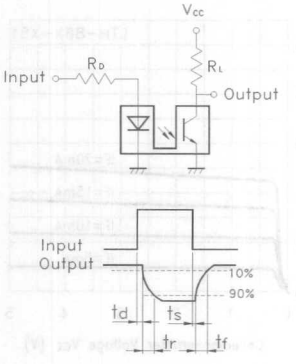


Fig.9 Response Time vs. Load Resistance



Test Circuit for Response Time



Actuator Photointerrupters

LTH-306-08/LTH-306-09

Features

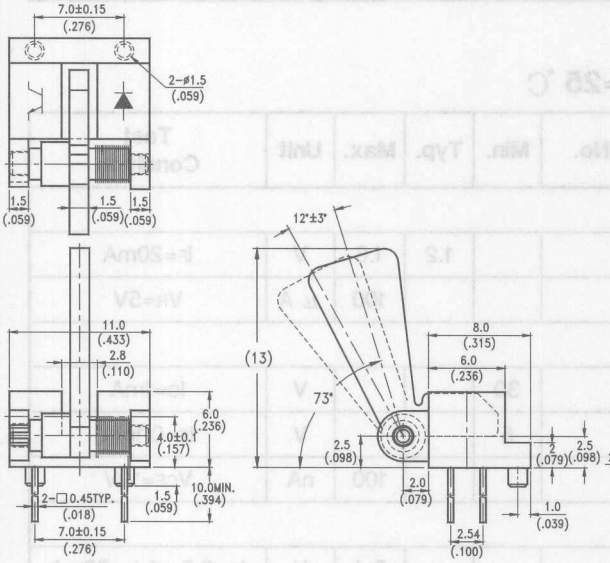
- Mechanical switch replacement.
- For direct PC board or dual-in line socket mounting.
- Customized lever arm can be designed for specific application.
- Guaranteed actuator life 10^6 times .

Description

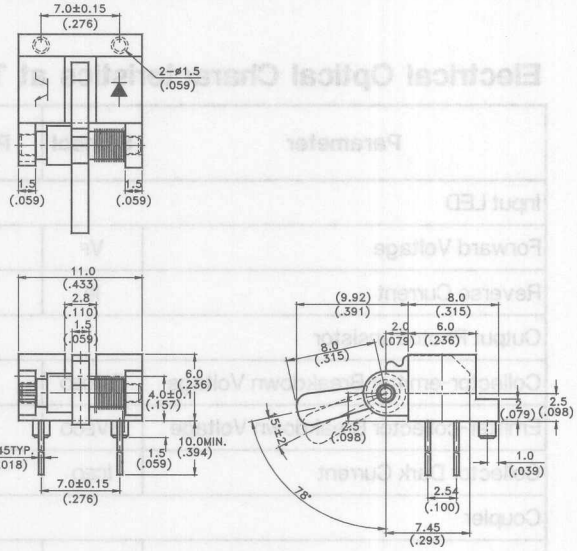
The LTH-306-08/LTH-306-09 consist of Gallium Arsenide infrared emitting diode and a NPN sillicon phototransistor mounted in a black plastic housing. Phototransistor switching takes place whenever the level arm unblock the slot. They are designed for direct soldering into PC board or mounting in standard dual-in-line socket.

Package Dimensions

LTH-306-08



LTH-306-09



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25 mm (.010").
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter		Symbol	Maximum Rating	Unit
Input LED	Continuous Forward Current	I_F	60	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current (Pulse Wide=10 μ S,300PPS)	I_{CP}	1	A
	Power Dissipation	P_D	75	mW
Output Phototransistor	Collector Current	I_C	20	mA
	Power Dissipation	P_C	100	mW
	Collector-emitter Voltage	V_{CEO}	30	V
	Emitter-collector Voltage	V_{ECO}	5	V
Operating Temperature Range		T_{opr}	-25 ℃ to 85 ℃	
Storage Temperature Range		T_{stg}	-40 ℃ to 100 ℃	
Lead Soldering Temperature [1.6mm(.063 in.) from body]		T_S	260 ℃ for 5 seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Part No.	Min.	Typ.	Max.	Unit	Test Condition
Input LED							
Forward Voltage	V_F			1.2	1.6	V	I_F=20mA
Reverse Current	I_R				100	μ A	V_R=5V
Output Phototransistor							
Collector-emitter Breakdown Voltage	BV_{CEO}		30			V	I_C=1mA
Emitter-collector Breakdown Voltage	BV_{ECO}		5			V	I_E=0.1mA
Collector Dark Current	I_{CEO}				100	nA	V_{CE}=10V
Coupler							
Collector-emitter Saturation Voltage	$V_{CE(sat)}$				0.4	V	I_C=0.5mA,I_F=20mA
On State Collector Current	$I_{C(ON)}$		0.5			mA	V_{CE}=5V,I_F=20mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.1 Power Dissipation vs. Ambient Temperature

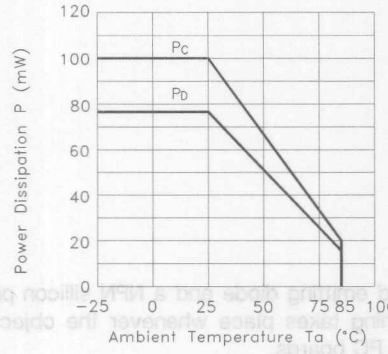


Fig.2 Forward Current vs. Forward Voltage

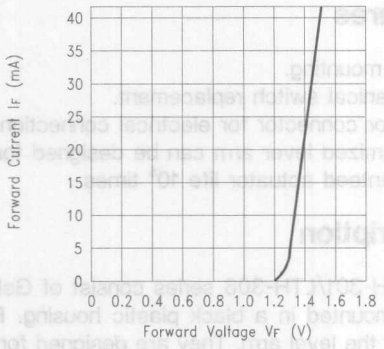


Fig.3 Collector Current vs. Collector-emitter Voltage

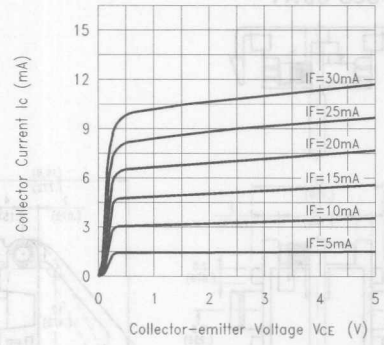


Fig.4 Collector Current vs. Ambient Temperature

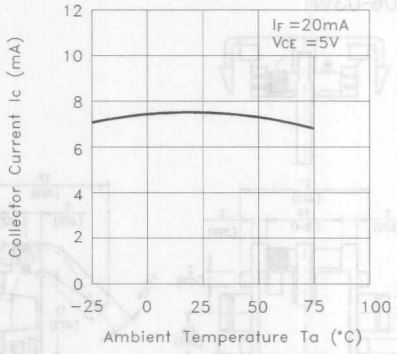
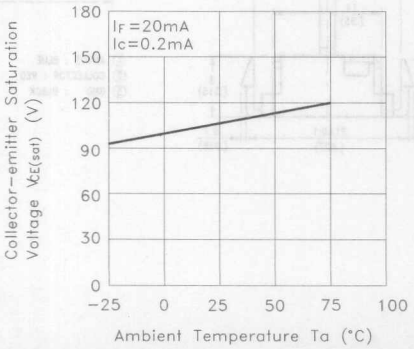


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature



LITEON

Actuator Photointerrupters

LTH-306-03W1/LTH-306-06W1/LTH-306-07W1
LTH-301-25W1/LTH-301-25W2/LTH-301-26W1

Features

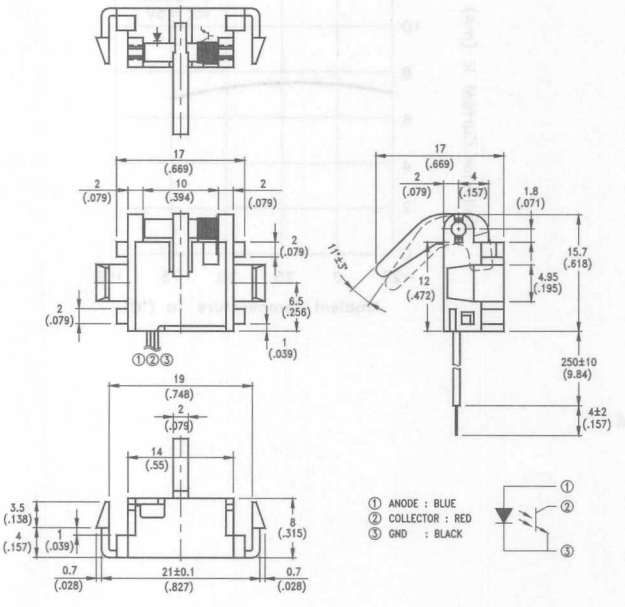
- Snap mounting.
- Mechanical switch replacement.
- Wire or connector for electrical connection.
- Customized lever arm can be designed for specific application.
- Guaranteed actuator life 10^6 times .

Description

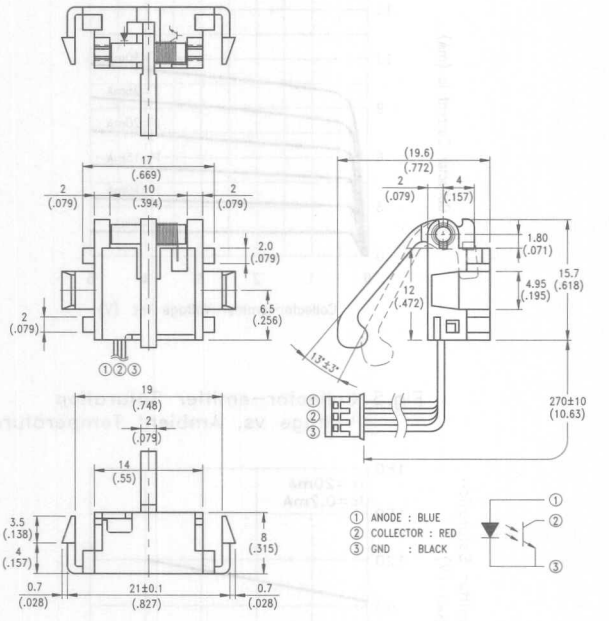
The LTH-301/LTH-306 series consist of Gallium Arsenide infrared emitting diode and a NPN sillicon phototransistor mounted in a black plastic housing. Phototransistor switching takes place whenever the object passes through the level arm. They are designed for wire or connector to PC boards.

Package Dimensions

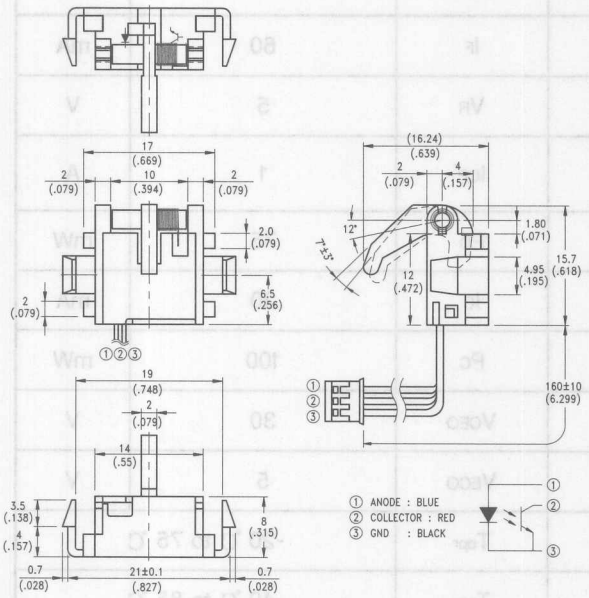
LTH-306-03W1



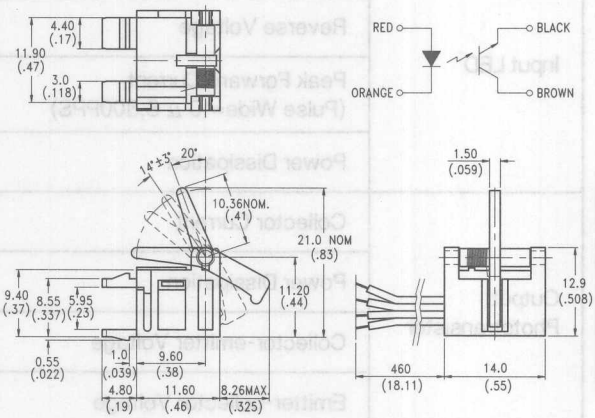
LTH-306-06W1



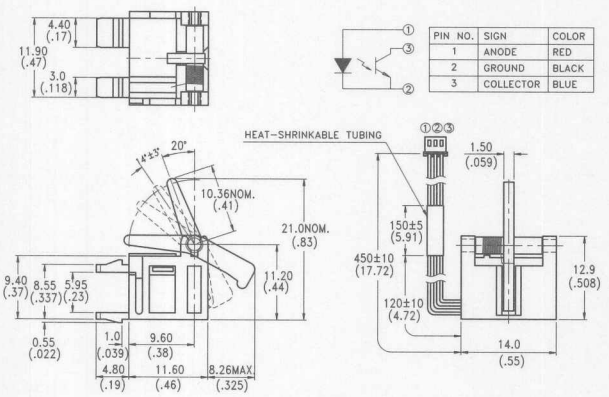
LTH-306-07W1



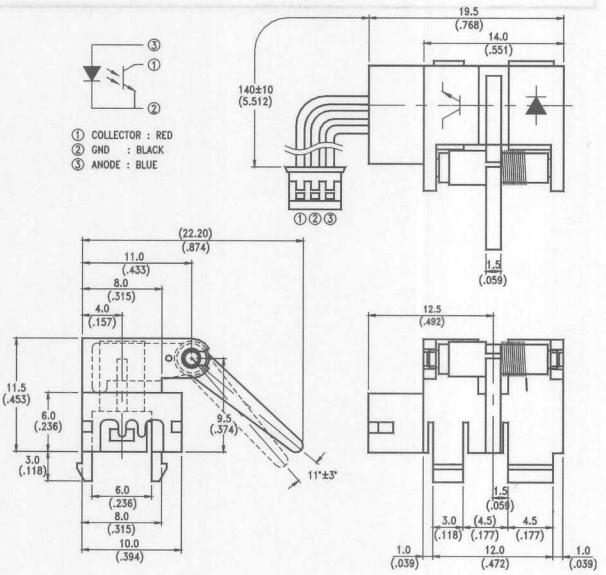
LTH-301-25W1



LTH-301-25W2



LTH-301-26W1



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25 mm (.010").
3. Specifications are subject to change without notice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter		Symbol	Maximum Rating	Unit
Input LED	Continuous Forward Current	I_F	60	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current (Pulse Wide=10 μ S,300PPS)	I_{CP}	1	A
	Power Dissipation	P_D	75	mW
Output Phototransistor	Collector Current	I_C	20	mA
	Power Dissipation	P_C	100	mW
	Collector-emitter Voltage	V_{CEO}	30	V
	Emitter-collector Voltage	V_{ECO}	5	V
Operating Temperature Range		T_{opr}	-20 ℃ to 75 ℃	
Storage Temperature Range		T_{stg}	-40 ℃ to 85 ℃	
Lead Soldering Temperature [1.6mm(.063 in.) from body]		T_S	260 ℃ for 5 seconds	

Electrical Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Part No.	Min.	Typ.	Max.	Unit	Test Condition
Input LED							
Forward Voltage	V_F			1.2	1.6	V	I_F=20mA
Reverse Current	I_R				100	μA	V_R=5V
Output Phototransistor							
Collector-emitter Breakdown Voltage	BV_{CEO}		30			V	I_C=1mA
Emitter-collector Breakdown Voltage	BV_{ECO}		5			V	I_E=0.1mA
Collector Dark Current	I_{CEO}				100	nA	V_{CE}=10V
Coupler							
Collector-emitter Saturation Voltage	$V_{CE(sat)}$	LTH-306-03W1			0.4	V	I_C=0.5mA,I_F=20mA
		LTH-306-06W1			0.4		I_C=0.5mA,I_F=20mA
		LTH-306-07W1			0.4		I_C=0.5mA,I_F=20mA
		LTH-301-25W1			0.4		I_C=0.5mA,I_F=20mA
		LTH-301-25W2			0.4		I_C=0.5mA,I_F=20mA
		LTH-301-26W1			0.4		I_C=2.0mA,I_F=20mA
On State Collector Current	$I_{C(ON)}$	LTH-306-03W1	0.5	2.0		mA	V_{CE}=5V,I_F=20mA
		LTH-306-06W1	0.5	2.0			
		LTH-306-07W1	0.5	2.0			
		LTH-301-25W1	0.5	2.0			
		LTH-301-25W2	0.5				
		LTH-301-26W1	2.0				

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.1 Power Dissipation vs. Ambient Temperature

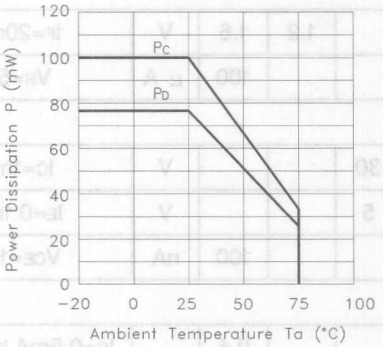


Fig.2 Forward Current vs. Forward Voltage

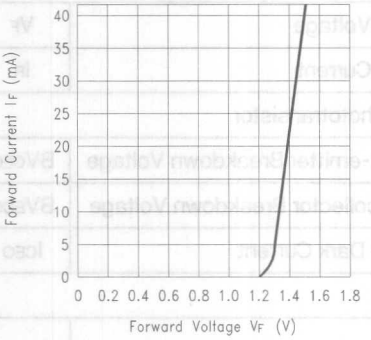


Fig.3 Collector Current vs. Collector−emitter Voltage

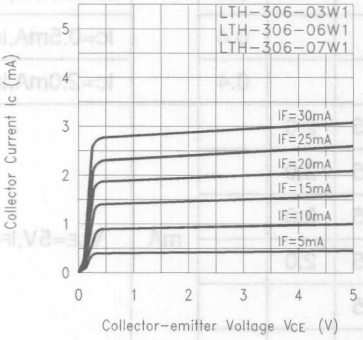


Fig.4 Collector Current vs. Collector−emitter Voltage

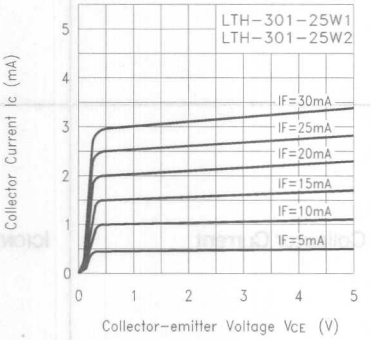


Fig.5 Collector Current vs. Collector−emitter Voltage

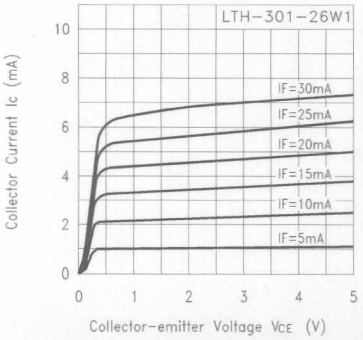
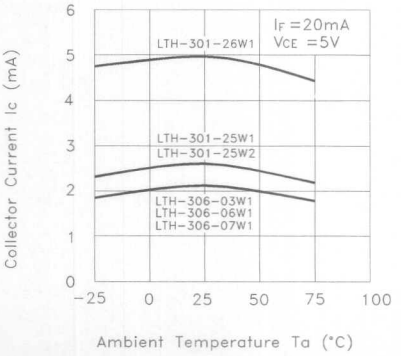
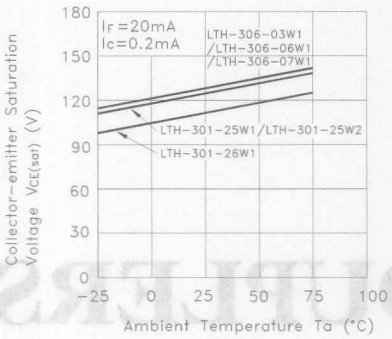


Fig.6 Collector Current vs. Ambient Temperature



Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

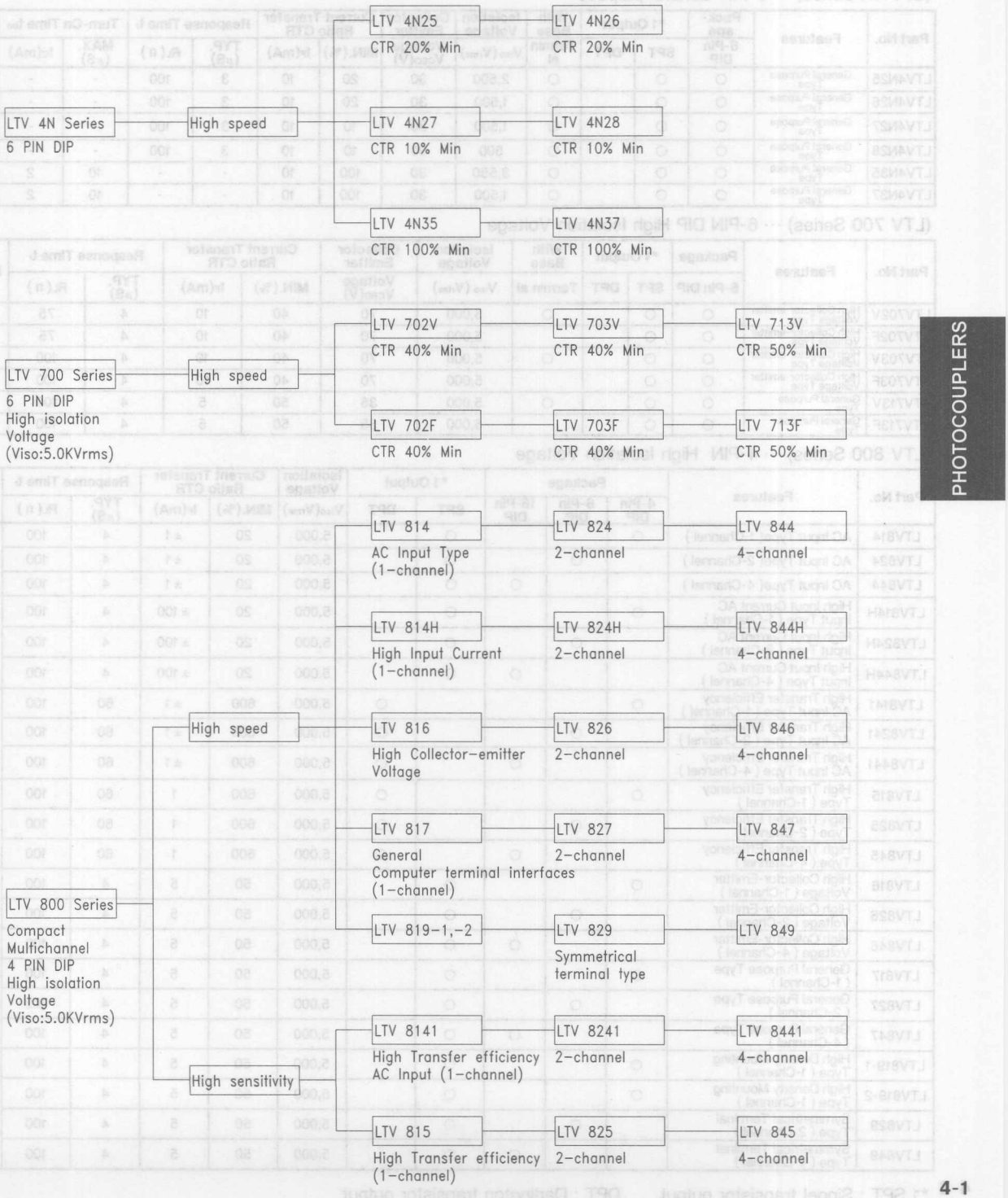
Fig.7 Collector-emitter Saturation Voltage vs. Ambient Temperature



4. PHOTOCOUPLERS

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Classification Chart



Selection Guide

(LTV 4N Series) ··· 6-PIN General purpose

Part No.	Features	Pack-age	*1 Output		With Base	Isolation Voltage	Collector Emitter	Current Transfer Ratio CTR		Response Time t_r		Turn-On Time t_{on}		Page No.
		6-Pin DIP	SPT	DPT	Termin al	V_{iso} (V_{rms})	Voltage V_{CEO}(V)	MIN.(%)	I_F(mA)	TYP. (μS)	R_L(Ω)	MAX. (μS)	I_C(mA)	
LTV4N25	General Purpose Type	○	○		○	2,500	30	20	10	3	100	-	-	4-7
LTV4N26	General Purpose Type	○	○		○	1,500	30	20	10	3	100	-	-	
LTV4N27	General Purpose Type	○	○		○	1,500	30	10	10	3	100	-	-	
LTV4N28	General Purpose Type	○	○		○	500	30	10	10	3	100	-	-	
LTV4N35	General Purpose Type	○	○		○	3,550	30	100	10	-	-	10	2	4-12
LTV4N37	General Purpose Type	○	○		○	1,500	30	100	10	-	-	10	2	

(LTV 700 Series) ··· 6-PIN DIP High Isolation Voltage

Part No.	Features	Package	*1 Output		With Base	Isolation Voltage	Collector Emitter	Current Transfer Ratio CTR		Response Time t_r		Page No.
		6-Pin DIP	SPT	DPT	Termin al	V_{iso} (V_{rms})	Voltage V_{CEO}(V)	MIN.(%)	I_F(mA)	TYP. (μS)	R_L(Ω)	
LTV702V	High Collector-emitter Volltage Type	○	○		○	5,000	70	40	10	4	75	4-17
LTV702F	High Collector-emitter Volltage Type	○	○			5,000	70	40	10	4	75	4-23
LTV703V	High Collector-emitter Volltage Type	○	○		○	5,000	70	40	10	4	100	4-29
LTV703F	High Collector-emitter Volltage Type	○	○			5,000	70	40	10	4	100	4-35
LTV713V	General Purpose Type	○	○		○	5,000	35	50	5	4	100	4-41
LTV713F	General Purpose Type	○	○			5,000	35	50	5	4	100	4-47

(LTV 800 Series) ··· 4-PIN High Isolation Voltage

Part No.	Features	Package			*1 Output		Isolation Voltage	Current Transfer Ratio CTR		Response Time t_r		Page No.
		4-Pin DIP	8-Pin DIP	16-Pin DIP	SPT	DPT	V_{iso}(V_{rms})	MIN.(%)	I_F(mA)	TYP. (μS)	R_L(Ω)	
LTV814	AC Input Type(1-Channel)	○			○		5,000	20	±1	4	100	4-53
LTV824	AC Input Type(2-Channel)		○		○		5,000	20	±1	4	100	
LTV844	AC Input Type(4-Channel)			○	○		5,000	20	±1	4	100	
LTV814H	High Input Current AC Input Type (1-Channel)	○			○		5,000	20	±100	4	100	4-59
LTV824H	High Input Current AC Input Type (2-Channel)		○		○		5,000	20	±100	4	100	
LTV844H	High Input Current AC Input Type (4-Channel)			○	○		5,000	20	±100	4	100	
LTV8141	High Transfer Efficiency AC Input Type (1-Channel)	○				○	5,000	600	±1	60	100	4-65
LTV8241	High Transfer Efficiency AC Input Type (2-Channel)		○			○	5,000	600	±1	60	100	
LTV8441	High Transfer Efficiency AC Input Type (4-Channel)			○		○	5,000	600	±1	60	100	
LTV815	High Transfer Efficiency Type (1-Channel)	○				○	5,000	600	1	60	100	4-71
LTV825	High Transfer Efficiency Type (2-Channel)		○			○	5,000	600	1	60	100	
LTV845	High Transfer Efficiency Type (4-Channel)			○		○	5,000	600	1	60	100	
LTV816	High Collector-Emitter Voltage (1-Channel)	○			○		5,000	50	5	4	100	4-77
LTV826	High Collector-Emitter Voltage (2-Channel)		○		○		5,000	50	5	4	100	
LTV846	High Collector-Emitter Voltage (4-Channel)			○	○		5,000	50	5	4	100	
LTV817	General Purpose Type (1-Channel)	○			○		5,000	50	5	4	100	4-84
LTV827	General Purpose Type (2-Channel)		○		○		5,000	50	5	4	100	
LTV847	General Purpose Type (4-Channel)			○	○		5,000	50	5	4	100	
LTV819-1	High Density Mounting Type (1-Channel)	○			○		5,000	50	5	4	100	4-91
LTV819-2	High Density Mounting Type (1-Channel)	○			○		5,000	50	5	4	100	
LTV829	Symmetrical Terminal Type (2-Channel)		○		○		5,000	50	5	4	100	
LTV849	Symmetrical Terminal Type (4-Channel)			○	○		5,000	50	5	4	100	

 *1 SPT : Singel transistor output DPT : Darlington transistor output

Cross Reference Guide

LITON Part No.	SHARP Part No.	QTC Part No.	MOTOROLA Part No.	TELEFUNKEN Part No.	SEIMENS Part No.	TOSHIBA Part No.	NEC Part No.	KODENSHI Part No.
LTV4N25	PC4N25	4N25	4N25	4N25	4N25	4N25	4N25PS2001 PS2021	4N25
LTV4N26	PC4N26	4N26	4N26	4N26	4N26	4N26	-	-
LTV4N27	PC4N27	4N27	4N27	4N27	4N27	4N27	-	-
LTV4N28	PC4N28	4N28	4N28	4N28	4N28	4N28	-	-
LTV4N35	PC4N35	4N35	4N35	4N35	4N35	4N35	PS2021	-
LTV4N37	PC4N37	4N37	4N37	4N37	4N37	4N37	-	-
LTV702V	PC702V	CNX36	H11A2 H11A3	-	-	4N38A	-	-
LTV702VA	PC702VA	CNY17-1	CNY17-1	-	CNY17-1	CNY17-1	-	-
LTV702VB	PC702VB	CNY17-2	CNY17-2	CNY75A	CNY17-2	CNY17-2	-	-
LTV702VC	PC702VC	CNY17-3	CNY17-3	CNY75B	CNY17-3	CNY17-3	-	-
LTV702VD	PC702VD	CNY17-4	CNY17-4	CNY75C	CNY17-40	CNY17-4	-	-
LTV703V	PC703	-	H11A5	-	-	-	-	-
LTV703VA	PC703VA	-	-	-	-	-	-	-
LTV703VB	PC703VB	MCT2022	MCT2022	-	-	-	-	-
LTV703VC	PC703VC	MCT275	MCT275	-	-	-	-	-
LTV703VD	PC703VD	MCT210	-	-	-	-	-	-
LTV713V	PC713V	H11A1 MCT270	H11A1	CQY80N	IL1 IL74	-	-	-
LTV814	PC814	-	-	-	-	TLP520GB	PS2505-1	-
LTV824	PC824	-	-	-	-	TLP520-2	PS2505-2	-
LTV844	PC844	-	-	-	-	TLP520-4	PS2505-4	-
LTV8141	PC8141	-	-	-	-	-	-	-
LTV8241	PC8241	-	-	-	-	-	-	-
LTV8441	PC8441	-	-	-	-	-	-	-
LTV815	PC815	-	-	-	-	-	-	-
LTV825	PC825	-	-	-	ILD30	-	-	-
LTV845	PC845	-	-	-	ILQ30	-	-	-
LTV816	PC816	-	-	-	SFK615	TLP312	-	-
LTV826	PC826	-	-	K827P	ILD615	TLP312-2	-	-
LTV846	PC846	-	-	K847P	ILQ615	TLP312-4	-	-
LTV817	PC817	-	-	-	SFK610	TLP521-1 TLP621	PS2401-1 PS2501-1	PC-17T1
LTV827	PC827	-	-	K827P	-	TLP521-2 TLP621-2	PS2501-2 PS2501-2	PC-17T2
LTV847	PC847	-	-	K847P	-	TLP521-4 TLP621-4	PS2501-4 PS2501-4	PC-17T4
LTV829	PC829	-	-	CNY74-2	ILD1	TLP504A	-	-
LTV849	PC849	-	-	CNY74-4	ILQ2	TLP504A-2	-	-

Photocoupler Safety Standard Approval Table

Part No.	UL	TUV	VDE	CSA	FIMKO	NEMKO	DEMKO	SEMKO	BSI
LTV-4N25	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-4N26	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-4N27	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-4N28	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-4N35	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-4N37	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-702V	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	⊙
LTV-703V	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-713V	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-702F	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	⊙
LTV-703F	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-713F	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-814	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-824	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-844	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-814H	⊙		⊙ (1)	⊙					
LTV-824H			⊙ (1)						
LTV-844H			⊙ (1)						
LTV-8141	⊙	⊙		⊙	⊙	⊙	⊙	⊙	
LTV-8241	⊙	⊙		⊙	⊙	⊙	⊙	⊙	
LTV-8441	⊙	⊙		⊙	⊙	⊙	⊙	⊙	
LTV-815	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-825	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-845	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-817	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-827	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-847	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-819-1	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-819-2	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-829	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	
LTV-849	⊙	⊙	⊙ (1)	⊙	⊙	⊙	⊙	⊙	

⊙ : Approved for Taiwan and Thaiand ; including S,M types.
(1) VDE 0884 testing is an option ; the suffix "-V" must be added to the standard part number.

Regulatory Agency	Certificate File Number		
	LTV 4N series	LTV 700 series	LTV 800 series
UL	E113898	E113898	E113898
TUV	R9653630	R9653630	R9653630
VDE (for Thailand)	94722	94722	94722
CSA	LR91533	LR91533	LR91533
FIMKO	182728	182727	193422
NEMKO	P96103013	P96103013	P96103013
DEMKO	303985	303968	303986
SEMKO	9646047/01-30	9646047/01-30	9646047/01-30
BSI	-	7368	-

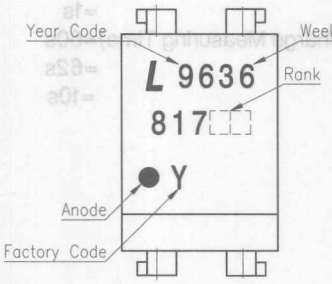
VDE Approved Photocouplers

■ VDE 0884 Approved Photocouplers

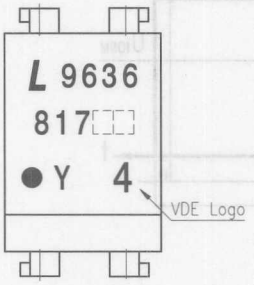
VDE has approved Liton's photocouplers against their VDE 0884 standard. The VDE 0884 components standard requires additional electrical testing to a stringent isolation partial discharge test.

VDE approval is based on mechanical and electrical performance of the Liton photocoupler package. This package incorporates specially developed materials and assembly processes optimizing thermal and moisture stability while maintaining the high level of LED life and isolation voltage. All VDE approved photocouplers are made in this package.

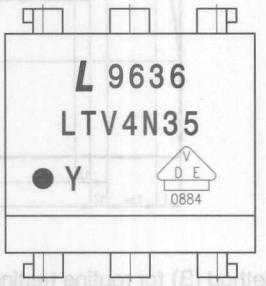
NOTE : VDE 0884 testing is an option; the suffix letters "-V" must be added to the standard model number. "-V" suffix devices have a special partial discharge test and marked with the VDE logo and 0884. The "-V" will not be marked on the device.(See below.)



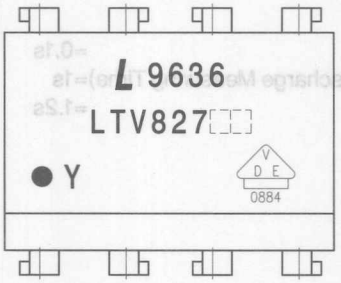
4 PIN Photocoupler Marking



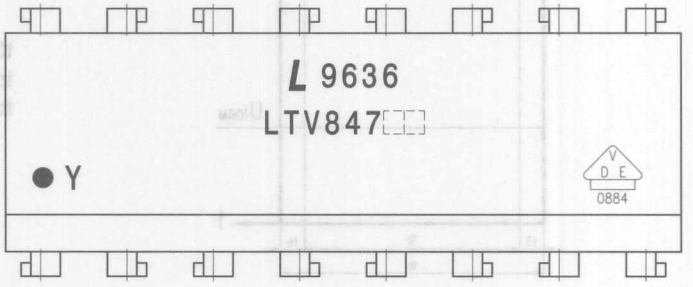
"-V"Suffix 4 PIN Photocoupler



"-V"Suffix 6 PIN Photocoupler



"-V"Suffix 8 PIN Photocoupler



"-V"Suffix 16 PIN Photocoupler

■ Order Information

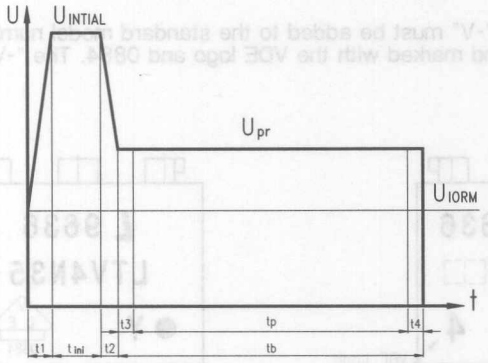
Description	Normal Model No.	VDE Approved Model No.
Standard Through Hole Package	LTV-xxxx	LTVxxxx-V
Lead With 0.4"(10.16mm)Spacing Package	LTV-xxxxM	LTVxxxxM-V
Lead Bends For Surface Mount (SMD) Package	LTV-xxxxS	LTVxxxxS-V
Tape And Reel Packaging Of Type I For SMD	LTV-xxxxS-TA	LTVxxxxSTA-V
Tape And Reel Packaging Of Type II For SMD	LTV-xxxxS-TA1	LTVxxxxSTA1-V

VDE Approved Photocouplers

■ VDE Partial Discharge Qualification Test

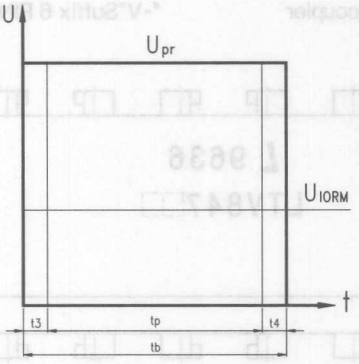
The test voltages applied are shown below. The partial discharge voltage U_{pr} is maintained for a specifled test time t_b, and during this time the partial discharge level is measured at a specifled time interval t_p.

Method (A) for type testing and random testing.



t1,t2 =1 to 10s
t3,t4 =1s
tp(Partial Discharge Measuring Time)=60s
tb =62s
tini =10s

Method (B) for routine testing.



t3,t4 =0.1s
tp(Partial Discharge Measuring Time)=1s
tb =1.2s

Test Conditions

Model	UIORM	UINITIAL	UPR	
			Method (A)	Method (B)
LTV 4N Series	420V	4,000V	788V	672V
LTV 700 Series	700V	6,000V	1,313V	1,120V
LTV 800 Series	850V	6,000V	1,594V	1,360V

The partial discharge level shall not exceed 5 pC during the partial discharge measuring time interval t_p under the test conditions shown above.

Note : No insulation test voltages shall exceed the initial voltage UINITIAL.

LITEON

General Purpose Type Photocoupler

LTV4N25/LTV4N26/LTV4N27/LTV4N28
LTV4N25S/LTV4N26S/LTV4N27S/LTV4N28S
LTV4N25M/LTV4N26M/LTV4N27M/LTV4N28M

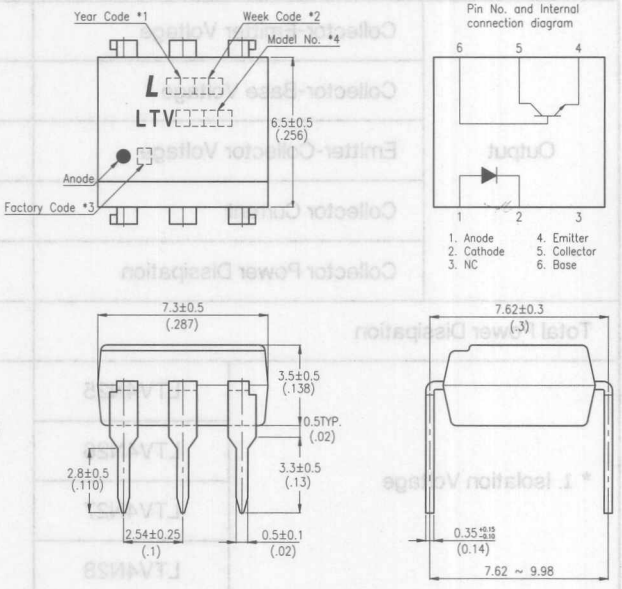
Features

- Response Time
  (t_r : TYP,3μs at V_{CE}=10V, I_C=2mA, R_L=100 Ω)
- UL approved (No. E113898)
- TUV approved (No.R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182728)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303985)
- SEMKO approved (No. 99646047101-30)
- VDE approved (No. 94722 Thailand)
- Options available :
  -Leads with 0.4"(10.16mm)spacing (M Type)
  -Leads bends for surface mounting(S Type)
  -Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  -Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  -VDE 0884 approvals (Add"-V"Suffix)

Applications

1. I/O interfaces for computers.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

Package Dimensions



Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

Absolute Maximum Ratings

(Ta=25 ℃)

Parameter			Symbol	Rating	Unit
Input	Forward Current		I_F	80	mA
	Reverse Voltage		V_R	6	V
	Power Dissipation		P	150	mW
Output	Collector-Emitter Voltage		V_{CEO}	30	V
	Collector-Base Voltage		V_{CBO}	70	V
	Emitter-Collector Voltage		B_{ECO}	7	V
	Collector Current		I_C	100	mA
	Collector Power Dissipation		P_C	150	mW
Total Power Dissipation			P_{tot}	250	mW
* 1. Isolation Voltage		LTV4N25	V_{iso}	2,500	V_{rms}
		LTV4N26		1,500	
		LTV4N27		1,500	
		LTV4N28		500	
Operating Temperature			T_{opr}	-55~+100	℃
Storage Temperature			T_{stg}	-55~+150	℃
* 2. Soldering Temperature			T_{sol}	260	℃

* 1. AC for 1 minute, R.H. = 40 ~ 60%
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.

* 2. For 10 seconds

Electrical/Optical Characteristics (Ta=25 ℃)

	Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage		V_F	—	1.2	1.5	V	I_F=10mA
	Reverse Current		I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance		C_t	—	50	—	pF	V=0, f=1kHz
Output	Collector Dark Current	LTV4N25/26/27	I_{CEO}	—	—	50	nA	V_{CE}=10V
		LTV4N28		—	—	100		
	Collector-Emitter Breakdown Voltage		BV_{CEO}	30	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage		BV_{ECO}	7	—	—	V	I_E=10μA
	Collector-Base Breakdown Voltage		BV_{CBO}	70	—	—	V	I_C=0.1mA
Transfer Characteristics	Collector Current	LTV4N25/26	I_C	2	—	—	mA	I_F=10mA V_{CE}=10V
		LTV4N27/28		1	—	—		
	*1 Current Transfer Ratio	LTV4N25/26	CTR	20	—	—	%	I_F=10mA V_{CE}=10V
		LTV4N27/28		10	—	—		
	Collector-emitter Saturation Voltage		$V_{CE(sat)}$	—	0.1	0.5	V	I_F=50mA, I_C=2mA
	Isolation Resistance		R_{ISO}	5×10^{10}	1×10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance		C_f	—	1.0	—	pF	V=0, f=1MHz
	Response Time (Rise)		t_r	—	3		μs	V_{CE}=10v, R_{BE}=∞ R_L=100 Ω, I_C=2mA
	Response Time (Fall)		t_f	—	3	—	μs	

*1. $CTR = \frac{I_C}{I_F} \times 100\%$

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Curent Vs. Ambient Temperature

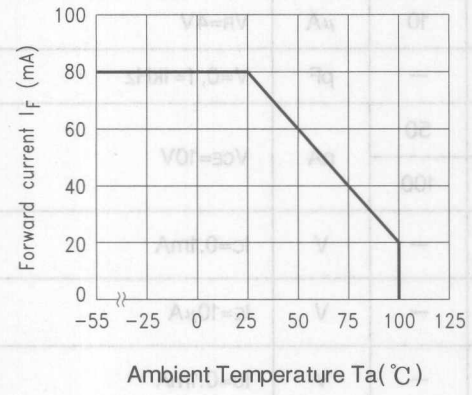


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

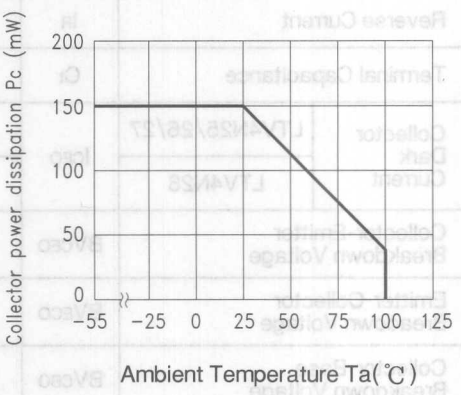


Fig. 3 Forward Current Vs. Forward Voltage

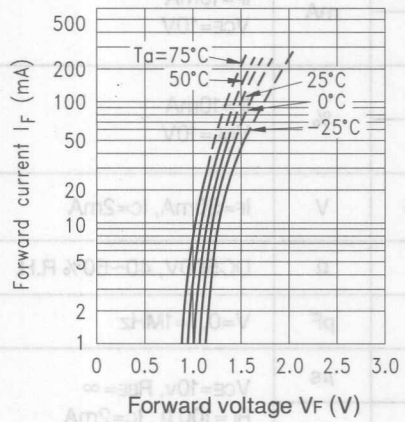


Fig. 4 Current Transfer Ratio VI. Forward Current

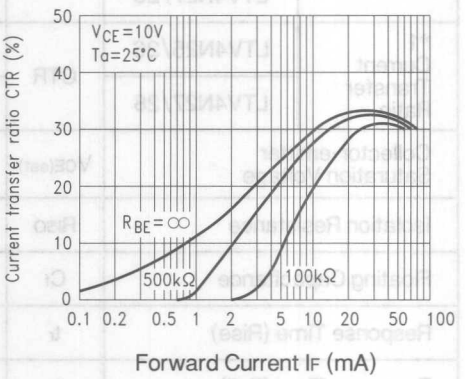


Fig. 5 Collector Current Vs. Collector-emitter voltage

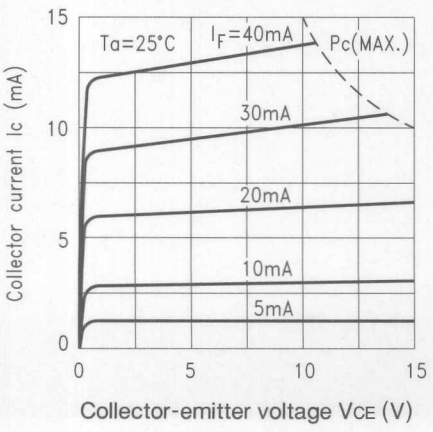


Fig. 6 Relative Current Transfer Ratio Vs. Ambient Temperature

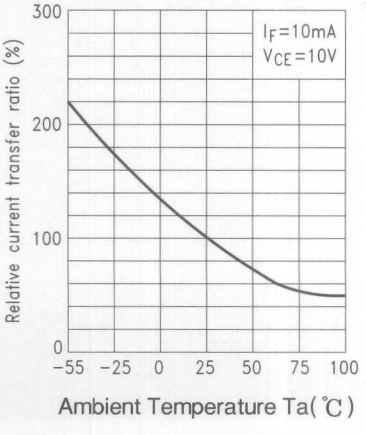


Fig. 7 Collector-imitter Saturation Voltage Vs. Ambient Temperature

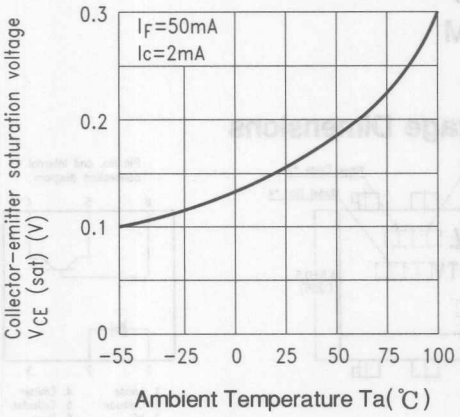


Fig. 8 Collector Dark Current Vs. Ambient Temperature

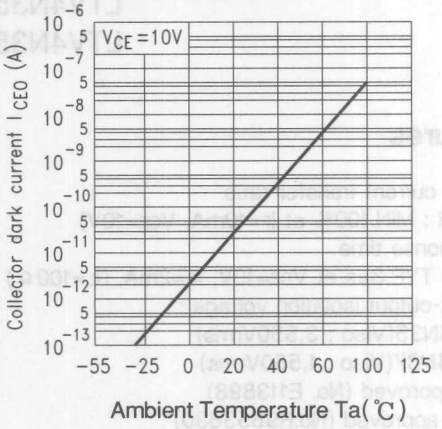


Fig. 9 Response Time Vs. Load Resistance

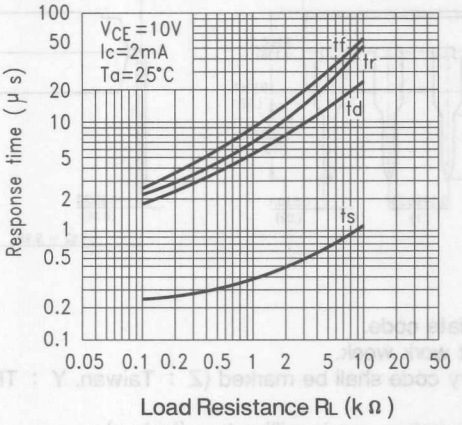


Fig. 10 Frequency Response

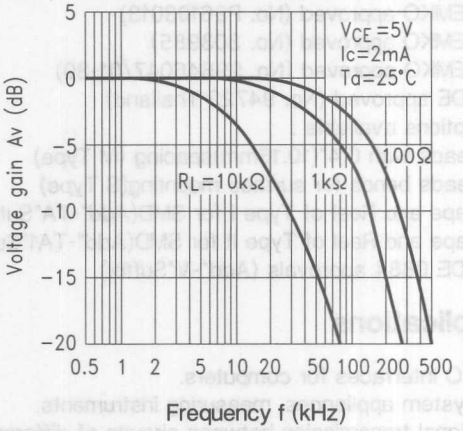
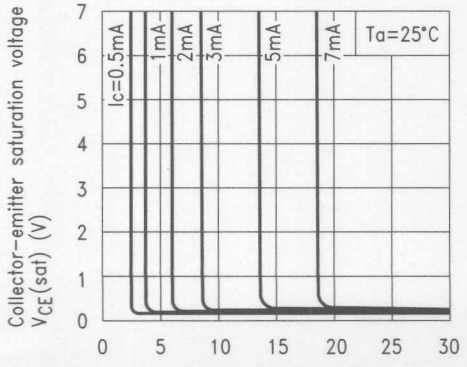
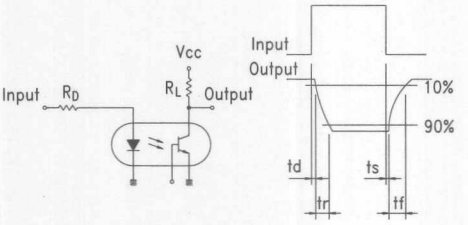


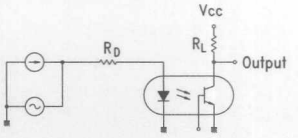
Fig. 11 Collector-emitter Saturation voltage Vs. Forward Current



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

General Purpose Type Photocoupler

LTV4N35/LTV4N37
LTV4N35S/LTV4N37S
LTV4N35M/LTV4N37M

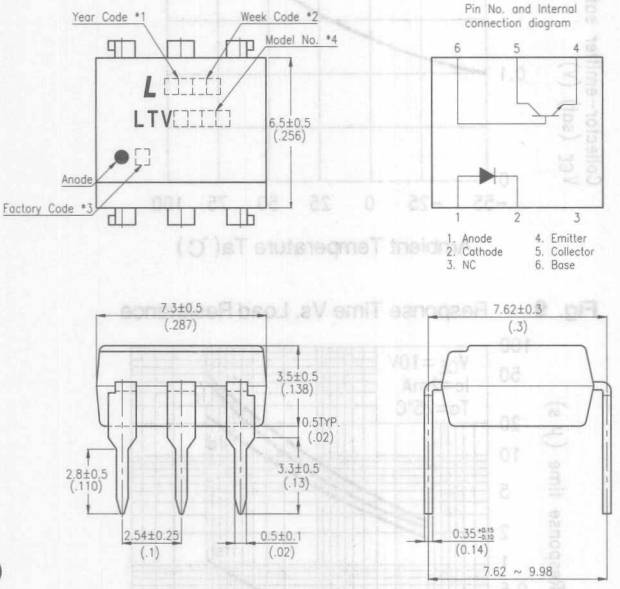
Features

- High current transfer ratio
  (CTR : MIN.100% at I_F=10mA, V_{CE}=10V)
- Response time
  (t_{on} : TYP,3μs at V_{CE}=10V, I_C=2mA, R_L=100 Ω)
- Input-output isolation voltage :
  LTV4N35(Viso : 3,550Vrms)
  LTV4N37(Viso : 1,550Vrms)
- UL approved (No. E113898)
- TUV approved (No.R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182728)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303985)
- SEMKO approved (No. 99646047/01-30)
- VDE approved (No. 94722 Thailand)
- Options available :
  -Leads with 0.4"(10.16mm)spacing (M Type)
  -Leads bends for surface mounting(S Type)
  -Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  -Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  -VDE 0884 approvals (Add"-V"Suffix)

Applications

1. I/O interfaces for computers.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

Package Dimensions



Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

Absolute Maximum Ratings (Ta=25 ℃)

Parameter			Symbol	Rating	Unit
Input	Forward Current		I_F	60	mA
	Reverse Voltage		V_R	6	V
	Power Dissipation		P	100	mW
Output	Collector-Emitter Voltage		V_{CEO}	30	V
	Collector-Base Voltage		V_{CBO}	70	V
	Emitter-Collector Voltage		V_{ECO}	7	V
	Collector Current		I_C	100	mA
	Collector Power Dissipation		P_C	300	mW
Total Power Dissipation			P_{tot}	350	mW
* 1. Isolation Voltage		LTV4N35	V_{iso}	3,550	V_{rms}
		LTV4N37		1,500	
Operating Temperature			T_{opr}	-55~+100	℃
Storage Temperature			T_{stg}	-55~+150	℃
* 2. Soldering Temperature			T_{sol}	260	℃

* 1. AC for 1 minute, 40 ~ 60% R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds

Electrical/Optical Characteristics (Ta=25 ℃)

	Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage		V_F	—	1.2	1.5	V	I_F=10mA
	Reverse Current		I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance		C_t	—	50	—	Pf	V=0, f=1KHz
Output	Collector Dark Current	Ta=25 ℃	I_{CEO}	—	—	50	nA	V_{CE}=10V
		Ta=25 ℃		—	—	500	μA	V_{CE}=30V
	Collector-Emitter Breakdown Voltage		BV_{CEO}	30	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage		BV_{ECO}	7	—	—	V	I_E=10μA
	Collector-Base Breakdown Voltage		BV_{CBO}	70	—	—	V	I_C=0.1mA
Transfer Characteristics	Collector Current	Ta=25 ℃	I_C	10	—	—	mA	I_F=10mA V_{CE}=10V
	*1 Current Transfer Ratio	Ta=25 ℃	CTR	100	—	—	%	I_F=10mA V_{CE}=10V
	Collector-emitter Saturation Voltage		$V_{CE(sat)}$	—	—	0.3	V	I_F=50mA, I_C=2mA
	Isolation Resistance		R_{ISO}	5×10^{10}	1×10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance		C_f	—	1.0	2.5	Pf	V=0, f=1MHz
	Response Time (Turn-on Time)		t_{on}	—	3	10	μs	V_{CC}=10v, R_{BE}=∞ R_L=100 Ω, I_C=2mA
	Response Time (Turn-off Time)		t_{off}	—	3	10	μs	

*1. CTR = $\frac{I_C}{I_F}$ x 100%

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Curent Vs. Ambient Temperature

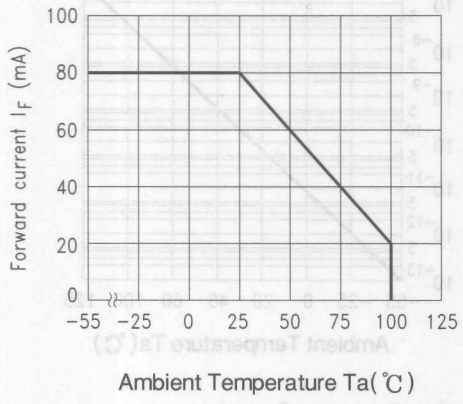


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

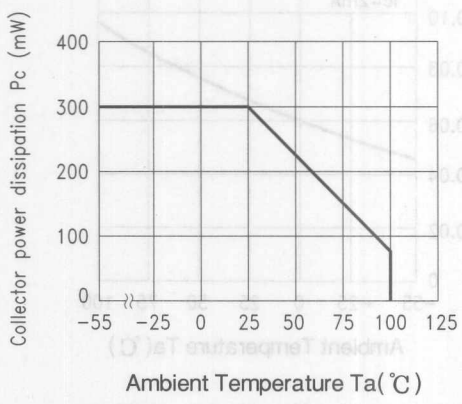


Fig. 3 Forward Current Vs. Forward Voltage

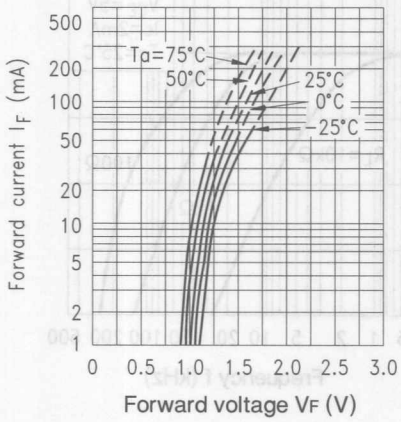


Fig. 4 Current Transfer Ratio VI. Forward Current

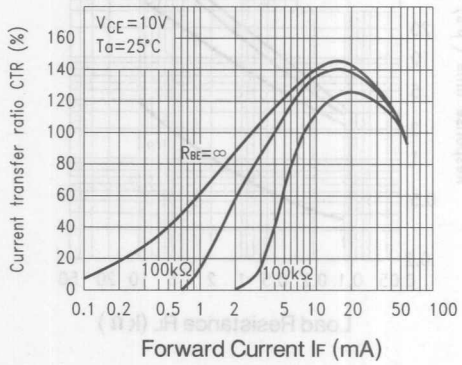


Fig. 5 Collector Current Vs. Collector-emitter Voltage

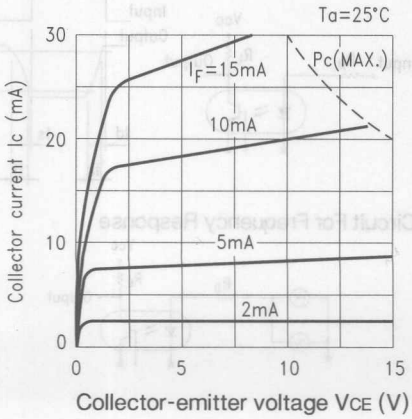
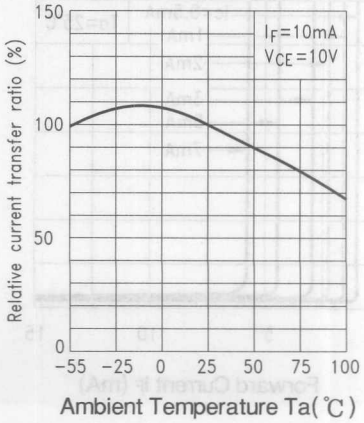


Fig. 6 Relative Current Transfer Ratio Ambient Temperature



PHOTOCOUPLERS

Fig. 7 Collector-imitter Saturation Voltage Vs. Ambient Temperature

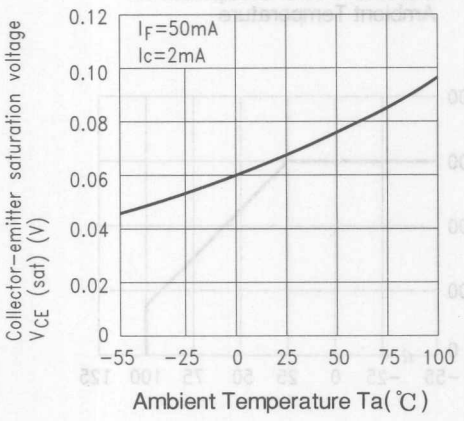


Fig. 8 Collector Dark Current Vs. Ambient Temperature

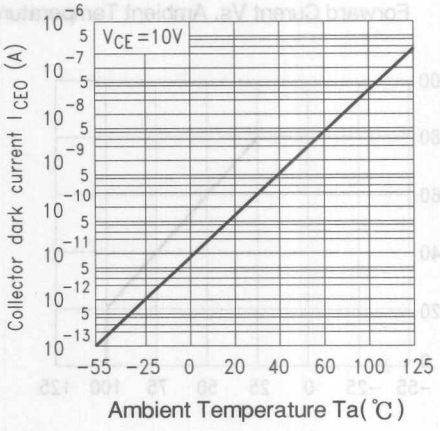


Fig. 9 Response Time Vs. Load Resistance

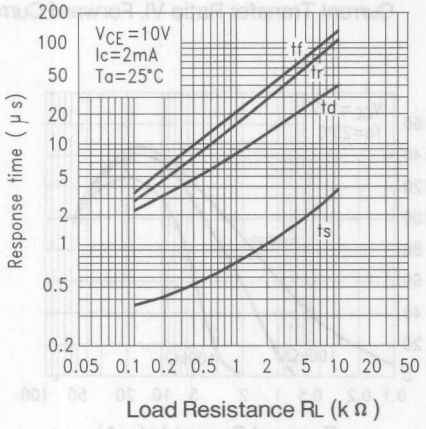


Fig. 10 Frequency Response

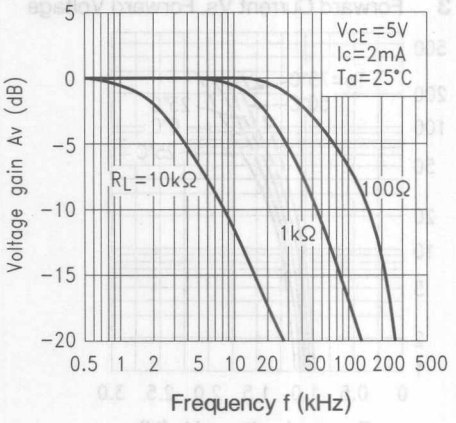
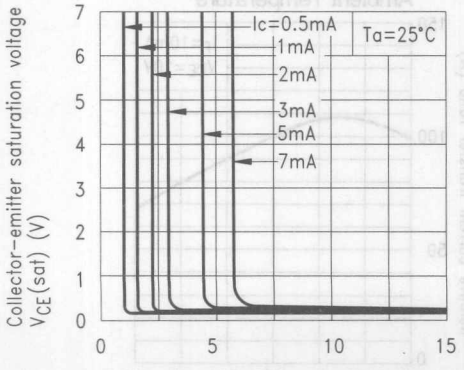
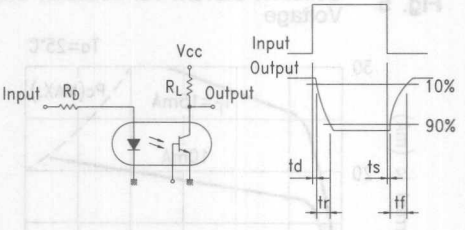


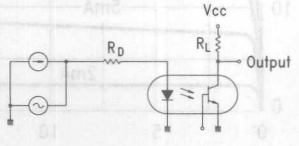
Fig. 11 Collector-emitter Saturation voltage Vs. Forward Current



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

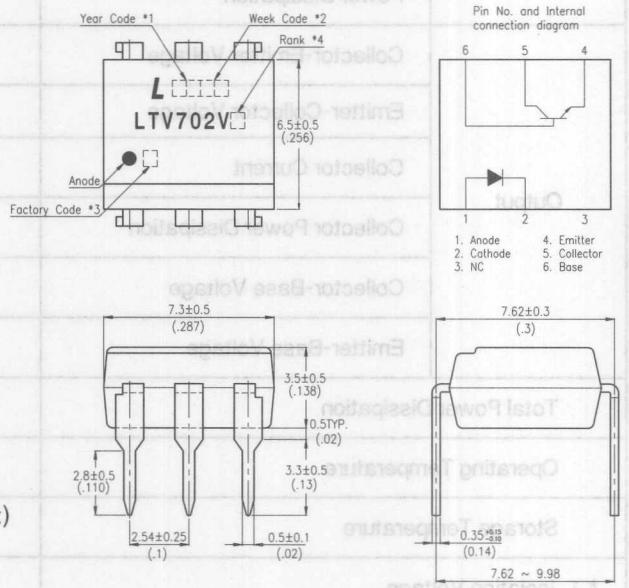
High Collector-Emitter Voltage Type

LTV702V/LTV702VS/LTV702VM

Features

- High collector-emitter voltage(V_{CEO}=70V)
- High input-output isolation voltage : (Viso : 5,000V_{rms})
- Directly connectable to TTL
- UL approved (No. E113898)
- TUV approved (No.R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182728)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303985)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- BSI approved (No. 7368)
- Options available :
  -Leads with 0.4"(10.16mm)spacing (M Type)
  -Leads bends for surface mounting(S Type)
  -Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  -Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  -VDE 0884 approvals (Add"-V"Suffix)

Package Dimensions



Applications

1. Telephone sets, telephone exchangers.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. Rank shall be or shall not be marked.
5. All dimensions are in millmenters(inches).
6. Tolerance is ± 0.25mm (.010") unless otherwise noted.
7. Specifications are subject to change without notice.

Absolute Maximum Ratings (Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	60	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	105	mW
Output	Collector-Emitter Voltage	V_{CEO}	70	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	160	mW
	Collector-Base Voltage	V_{CBO}	70	V
	Emitter-Base Voltage	V_{EBO}	6	V
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-55~+100	℃
Storage Temperature		T_{stg}	-55~+150	℃
* 1. Isolation Voltage		V_{iso}	5	kV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds.

Electrical/Optical Characteristics

(Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.4	1.7	V	I_F=60mA
	Reverse Current	I_R	—	—	10	μA	V_R=6V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	50	nA	V_{CE}=10V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	70	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
	Collector-Base Breakdown Voltage	BV_{CBO}	70	—	—	V	I_C=0.1mA
Transfer Characteristics	Collector Current	I_C	4	—	32	mA	I_F=10mA V_{CE}=5V
	* Current Transfer Ratio	CTR	40	—	320	%	I_F=10mA V_{CE}=5V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.25	0.4	V	I_F=10mA, I_C=2.5mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	—	150	—	KHz	V_{CC}=5v, I_F=10mA R_L=75 Ω, -3dB
	Response Time (Rise)	t_r	—	2	7	μs	V_{CC}=5V, I_F=10mA R_L=75 Ω
	Response Time (Fall)	t_f	—	2	8	μs	

* CTR = $\frac{I_C}{I_F} \times 100\%$

■ Supplement

Rank Table Of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV702V A	A	40~80
LTV702V B	B	63~125
LTV702V C	C	100~200
LTV702V D	D	160~320
LTV702V	A or B or C or D	40~320

Conditions	I_F=10mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

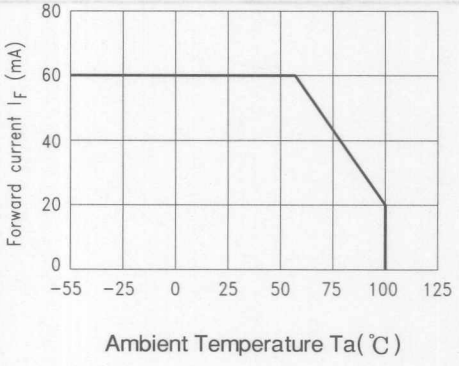


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

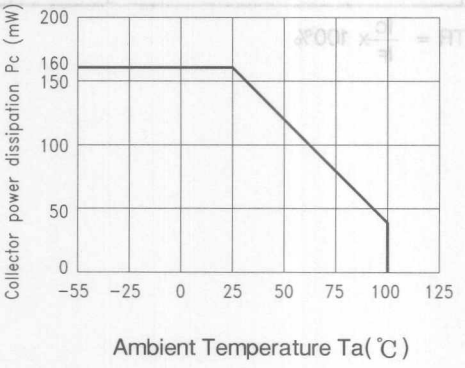


Fig. 3 Frequency Response

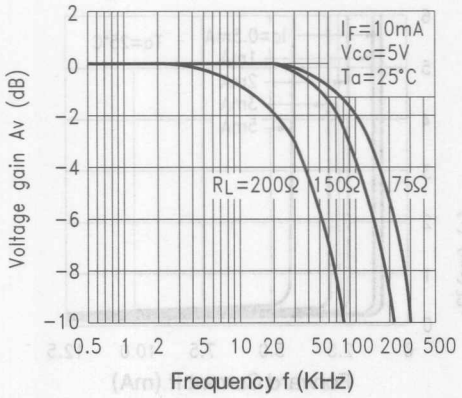


Fig. 4 Forward Current Vs. Forward Voltage

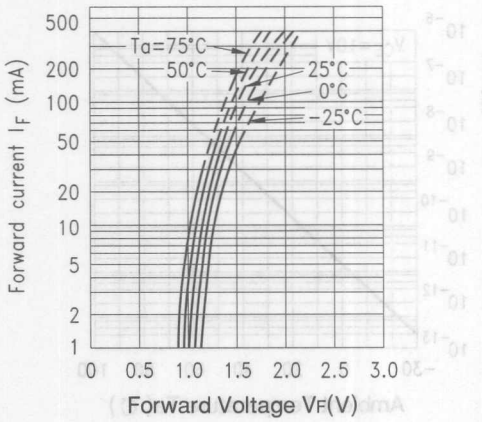


Fig. 5 Current Transfer Ratio Vs. Forward Current

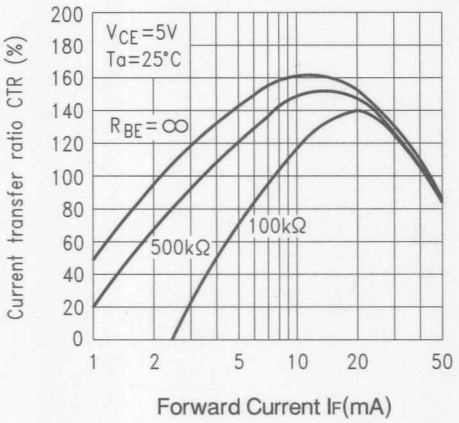


Fig. 6 Collector Current Vs. Collector-emitter Voltage

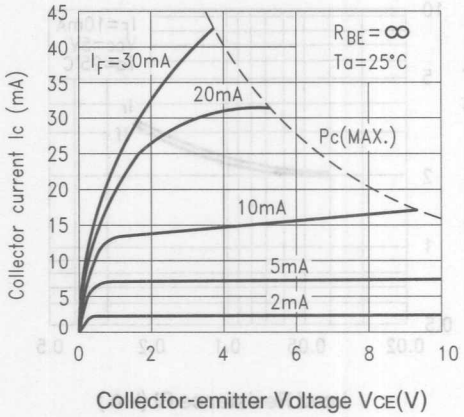


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

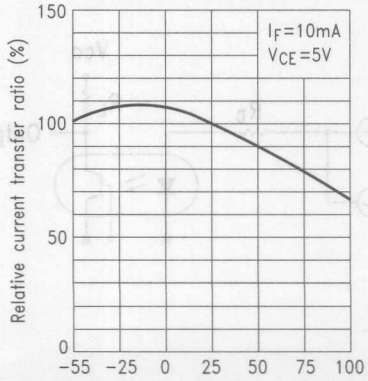


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

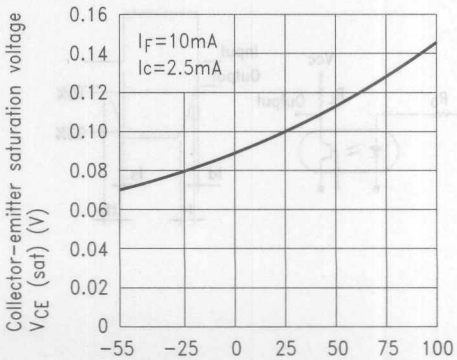


Fig. 9 Collector Dark Current Vs. Ambient Temperature

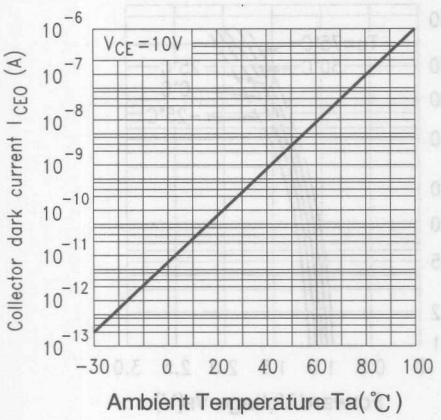


Fig. 10 Collector-imitter Saturation Voltage Vs. Forward Current

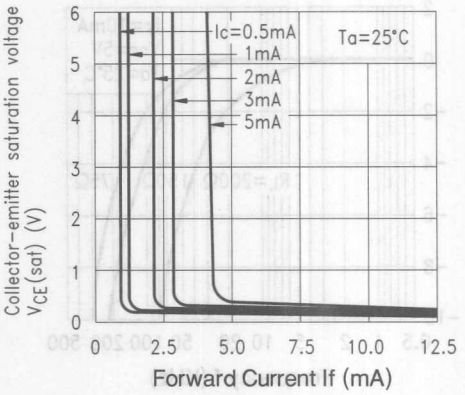
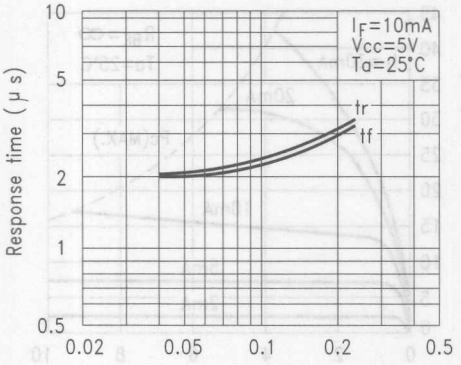
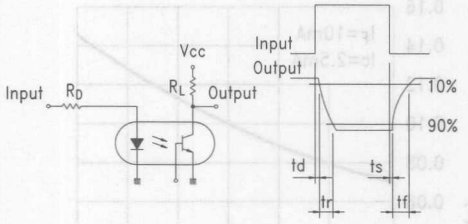


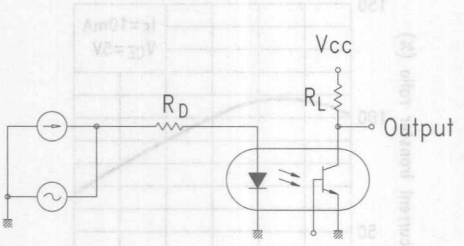
Fig. 11 Response Time Vs. Load Resistance



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

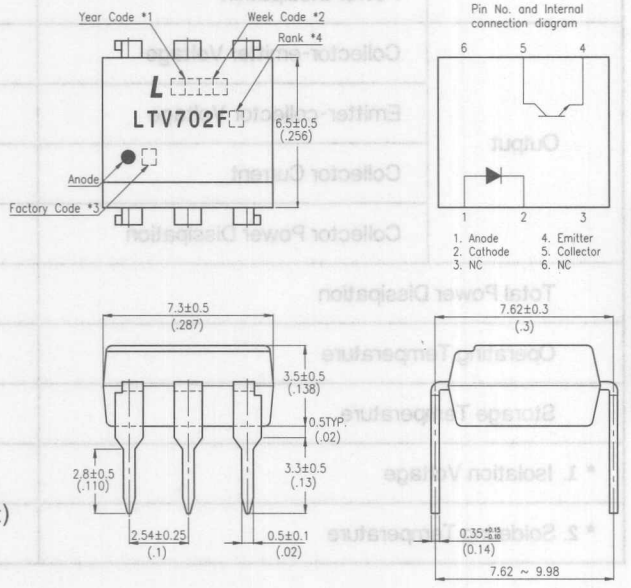
High Collector-Emitter Voltage Type Photocoupler

LTV702F/LTV702FS/LTV702FM

Features

- High collector-emitter voltage(V_{CEO}=70V)
- High input-output isolation voltage : (Viso : 5,000V_{rms})
- Directly connectable to TTL
- UL approved (No. E113898)
- TUV approved (No.R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182728)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303985)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- BSI approved (No. 7368)
- Options available :
  -Leads with 0.4"(10.16mm)spacing (M Type)
  -Leads bends for surface mounting(S Type)
  -Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  -Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  -VDE 0884 approvals (Add"-V"Suffix)

Package Dimensions



Applications

1. Telephone sets, telephone exchangers.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

PHOTOCOUPLERS

Absolute Maximum Ratings (Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	60	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	105	mW
Output	Collector-emitter Voltage	V_{CEO}	70	V
	Emitter-collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	160	mW
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-55~+100	℃
Storage Temperature		T_{stg}	-55~+150	℃
* 1. Isolation Voltage		V_{iso}	5	KV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds.

Electrical/Optical Characteristics

(Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.4	1.7	V	I_F=60mA
	Reverse Current	I_R	—	—	10	μA	V_R=6V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	50	nA	V_{CE}=10V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	70	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	4	—	32	mA	I_F=10mA V_{CE}=5V
	* Current Transfer Ratio	CTR	40	—	320	%	I_F=10mA V_{CE}=5V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.25	0.4	V	I_F=10mA, I_C=2.5mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	—	150	—	KHz	V_{CC}=5V, I_F=10mA R_L=75 Ω, -3dB
	Response Time (Rise)	t_r	—	2	7	μs	V_{CC}=5V, I_F=10mA R_L=75 Ω
	Response Time (Fall)	t_f	—	2	8	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

■ Supplement

Rank Table Of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV702F A	A	40~80
LTV702F B	B	63~125
LTV702F C	C	100~200
LTV702F D	D	160~320
LTV702F	A or B or C or D	40~320

Conditions	I_F=10mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

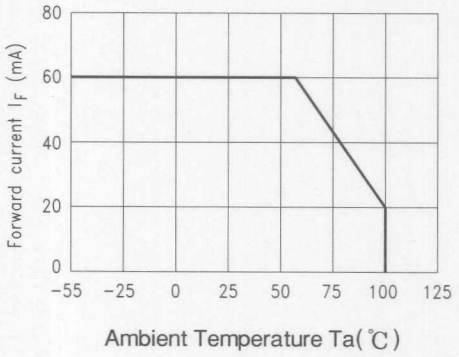


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

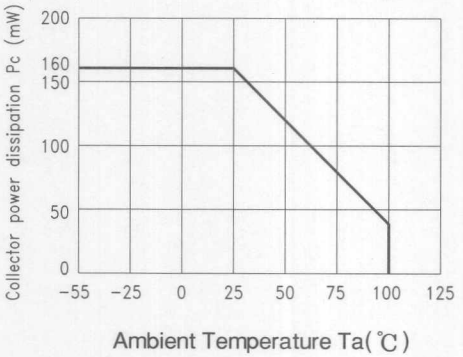


Fig. 3 Collector-emitter Saturation Voltage Vs. Forward Current

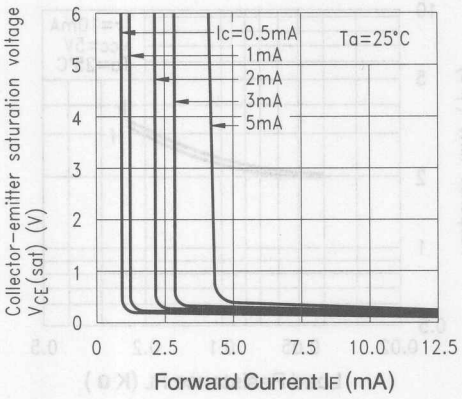


Fig. 4 Forward Current Vs. Forward Voltage

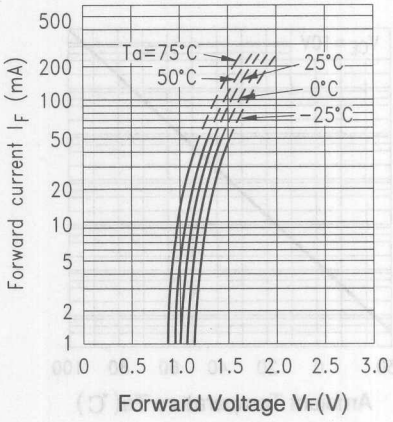


Fig. 5 Current Transfer Ratio Vs. Forward Current

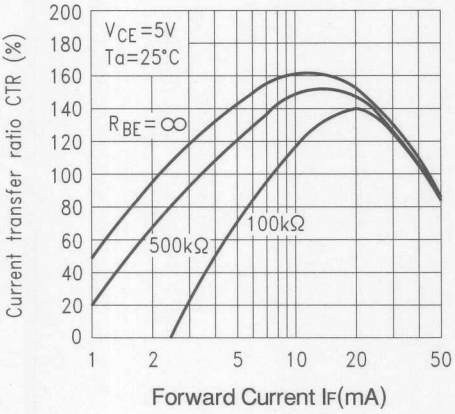


Fig. 6 Collector Current Vs. Collector-emitter Voltage

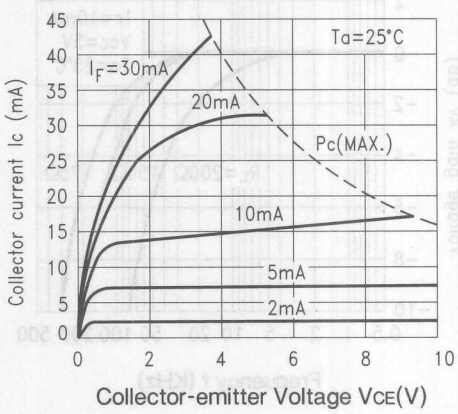


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

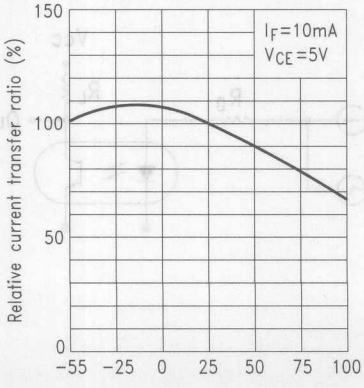
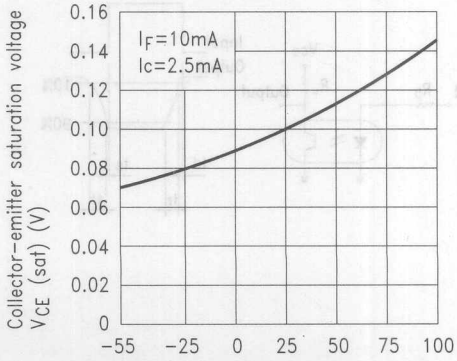


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature



PHOTOCOUPLERS

Fig. 9 Collector Dark Current Vs. Ambient Temperature

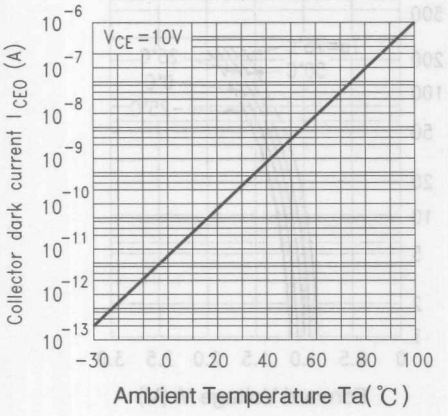


Fig. 10 Reaponse Time Vs. Load Resistance

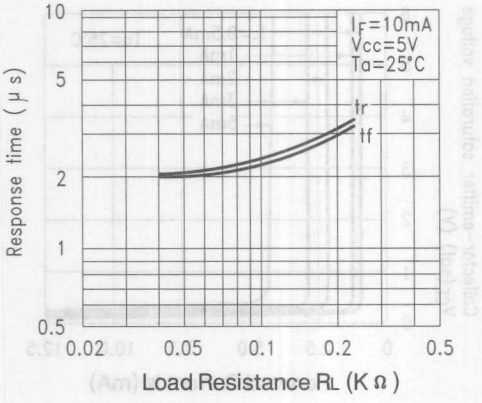
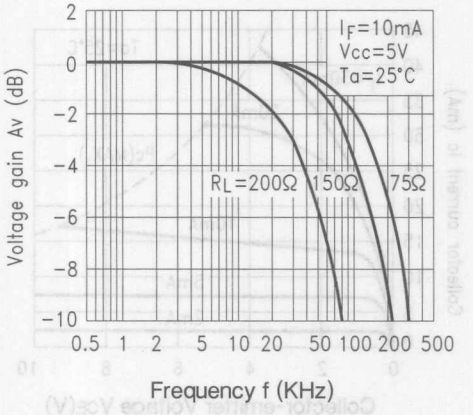
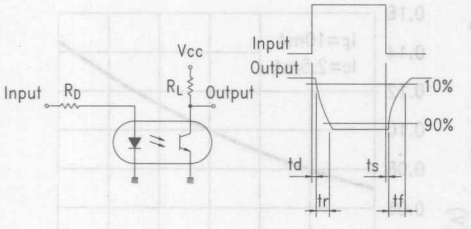


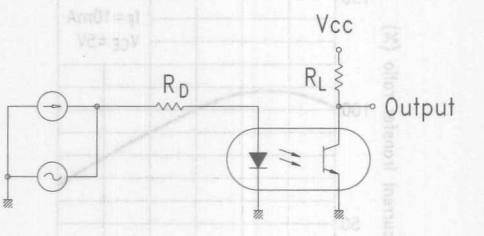
Fig. 11 Frequency Reaponse



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

High Collector-Emitter Voltage Type Photocoupler

LTV703V/LTV703VS/LTV703VM

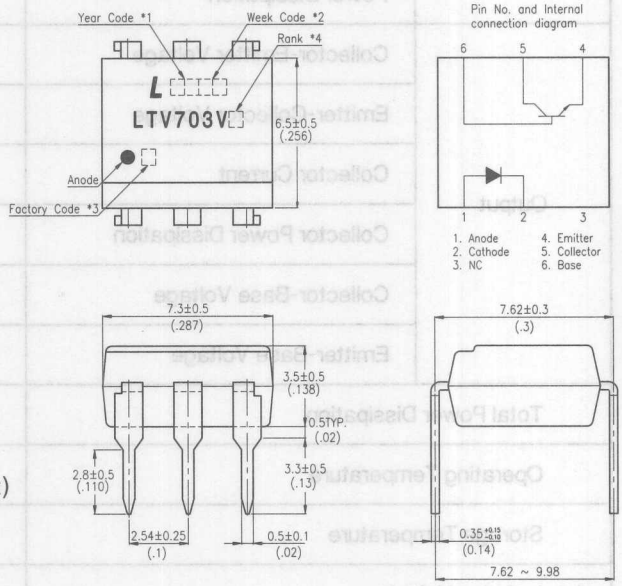
Features

- High collector-emitter voltage (V_{CEO}:70V)
- High input-output isolation voltage : (Viso : 5,000V_{rms})
- Directly connectable to TTL
- UL approved (No. E113898)
- TUV approved (No.R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182728)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303985)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- Options available :
  - -Leads with 0.4"(10.16mm)spacing (M Type)
  - -Leads bends for surface mounting(S Type)
  - -Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - -Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  - -VDE 0884 approvals (Add"-V"Suffix)

Applications

1. Telephone sets, telephone exchangers.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

Package Dimensions



Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

PHOTOCOUPLERS

Absolute Maximum Ratings (Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector-Emitter Voltage	V_{CEO}	70	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	160	mW
	Collector-Base Voltage	V_{CBO}	70	V
	Emitter-Base Voltage	V_{EBO}	6	V
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-30~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
* 1. Isolation Voltage		V_{iso}	5	kVrms
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute, R.H. = 40 ~ 60%
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds

Electrical/Optical Characteristics

(Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	70	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
	Collector-Base Breakdown Voltage	BV_{CBO}	70	—	—	V	I_C=0.1mA
Transfer Characteristics	Collector Current	I_C	4	—	32	mA	I_F=10mA V_{CE}=5V
	* Current Transfer Ratio	CTR	40	—	320	%	I_F=10mA V_{CE}=5V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	I_F=20mA, I_C=1mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	—	80	—	KHz	V_{CE}=5V, I_C=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	4	15	μs	V_{CE}=2V, I_C=2mA R_L=100Ω
	Response Time (Fall)	t_f	—	3	15	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

■ Supplement

Rank Table Of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV703V A	A	40~80
LTV703V B	B	63~125
LTV703V C	C	100~200
LTV703V D	D	160~320
LTV703V	A or B or C or D	40~320

Conditions	I_F=10mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

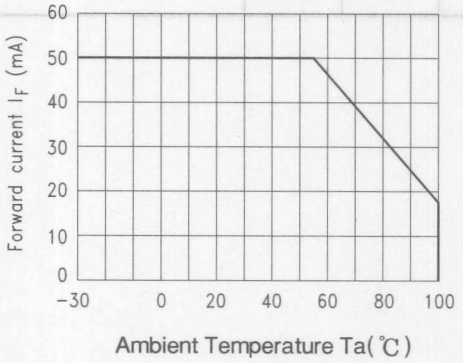


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

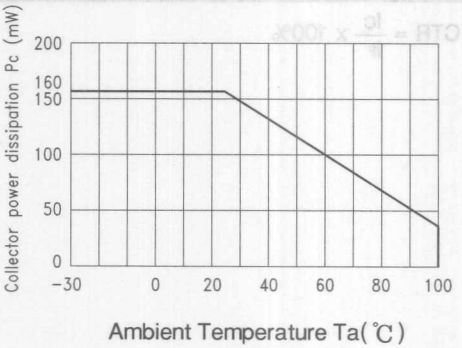


Fig. 3 Collector-emitter Saturation Voltage Vs. Forward Current

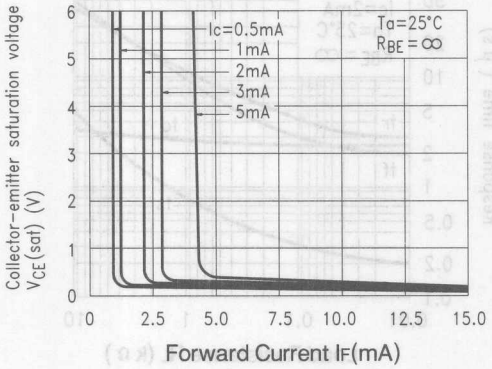


Fig. 4 Forward Current Vs. Forward Voltage

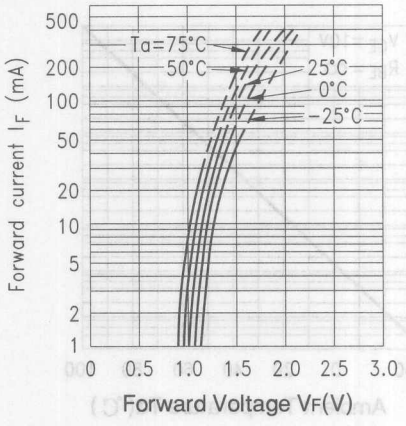


Fig. 5 Current Transfer Ratio Vs. Forward Current

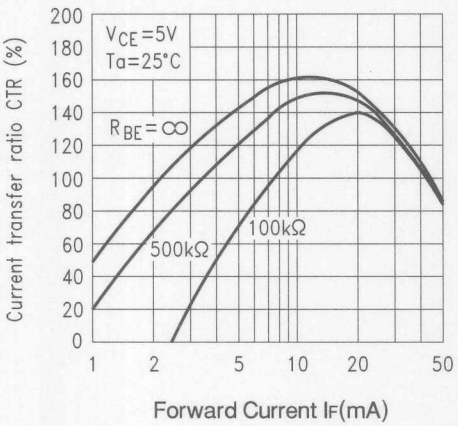


Fig. 6 Collector Current Vs. Collector-emitter Voltage

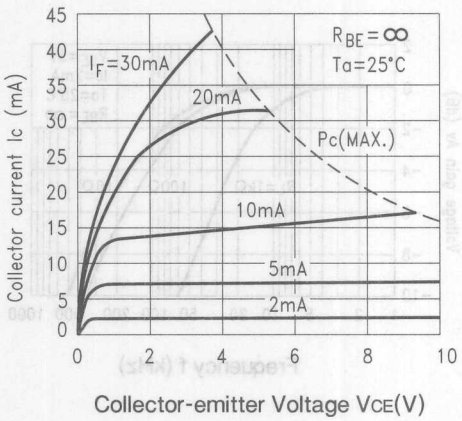


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

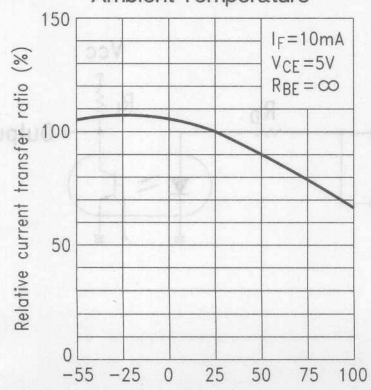


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

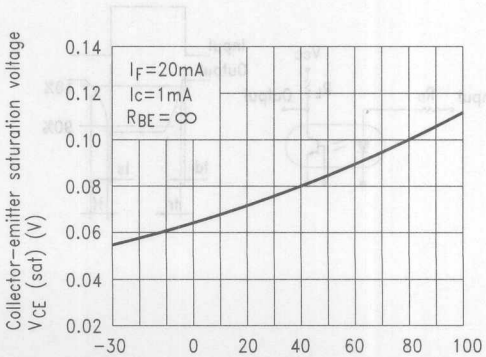


Fig. 9 Collector Dark Current Vs. Ambient Temperature

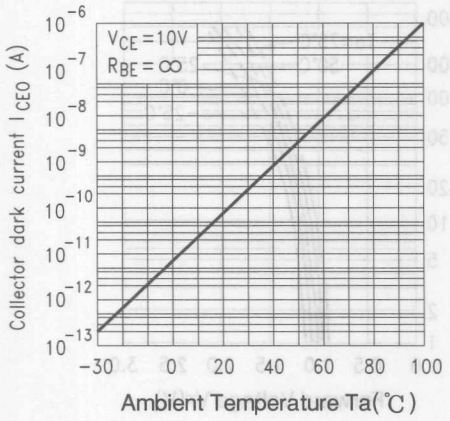


Fig. 10 Response Time Vs. Load Resistance

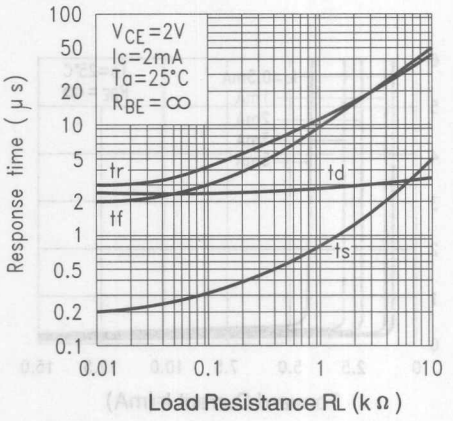
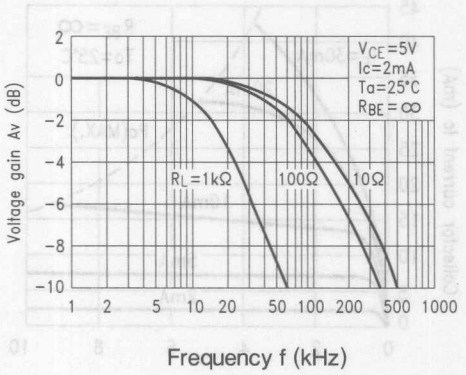
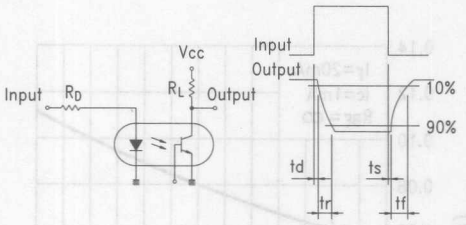


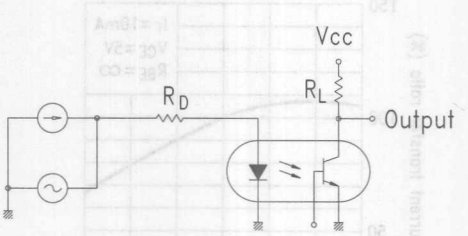
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



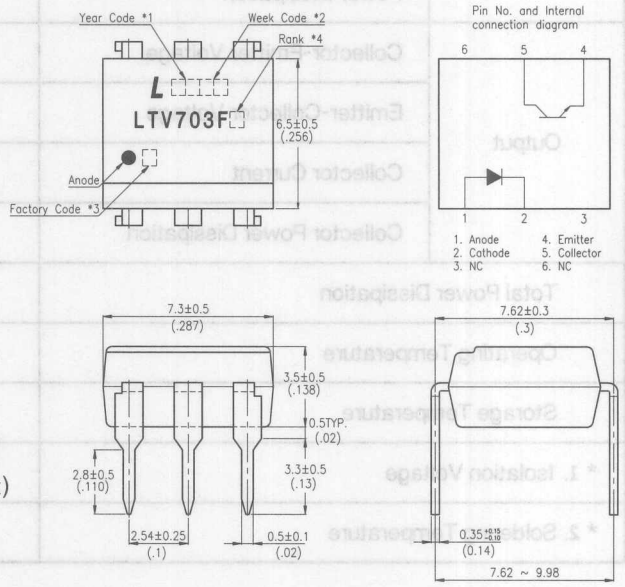
High Collector-Emitter Voltage Type

LTV703F/LTV703FS/LTV703FM

Features

- High collector-emitter voltage (V_{CEO}=70V)
- High input-output isolation voltage : (Viso : 5,000V_{rms})
- Directly connectable to TTL
- UL approved (No. E113898)
- TUV approved (No.R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182728)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303985)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- Options available :
  -Leads with 0.4"(10.16mm) spacing (M Type)
  -Leads bends for surface mounting(S Type)
  -Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  -Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  -VDE 0884 approvals (Add"-V"Suffix)

Package Dimensions



Applications

1. Telephone sets, telephone exchangers.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

Absolute Maximum Ratings (Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector-Emitter Voltage	V_{CEO}	70	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	160	mW
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-30~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
* 1. Isolation Voltage		V_{iso}	5	KV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds.

Electrical/Optical Characteristics

(Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	70	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	4	—	32	mA	I_F=10mA, V_{CE}=5V
	* Current Transfer Ratio	CTR	40	—	320	%	I_F=10mA, V_{CE}=5V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	I_F=20mA, I_C=1mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	—	80	—	KHz	V_{CE}=5V, I_F=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	4	15	μs	V_{CE}=2V, I_F=2mA R_L=100Ω
	Response Time (Fall)	t_f	—	3	15	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

■ Supplement

Rank Table Of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV703F A	A	40~80
LTV703F B	B	63~125
LTV703F C	C	100~200
LTV703F D	D	160~320
LTV703F	A or B or C or D	40~320

Conditions	I_F=10mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

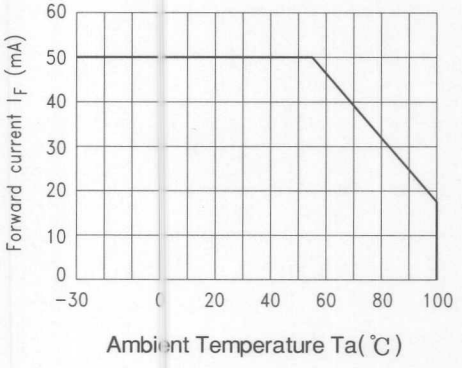


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

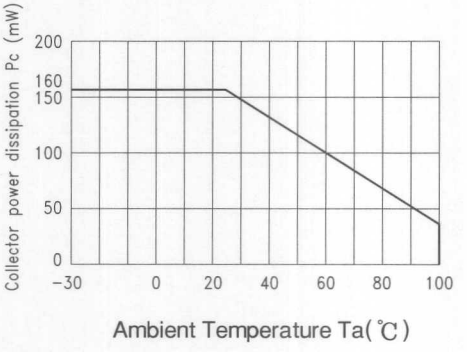


Fig. 3 Collector-emiter Saturation Voltage Vs. Forward Current

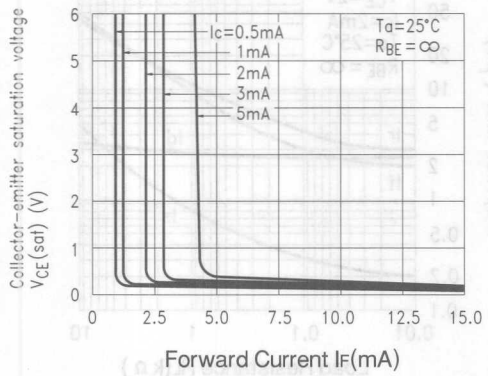


Fig. 4 Forward Current Vs. Forward Voltage

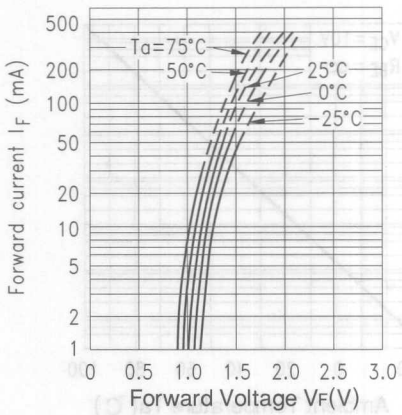


Fig. 5 Current Transfer Ratio Vs. Forward Current

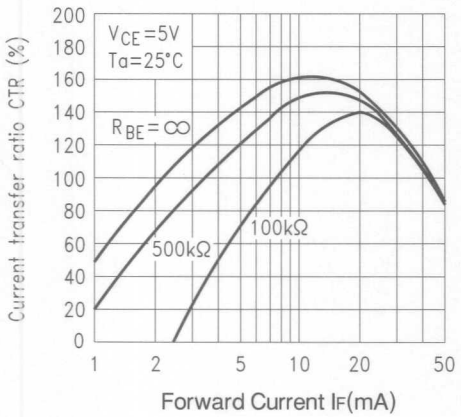


Fig. 6 Collector Current Vs. Collector-emitter Voltage

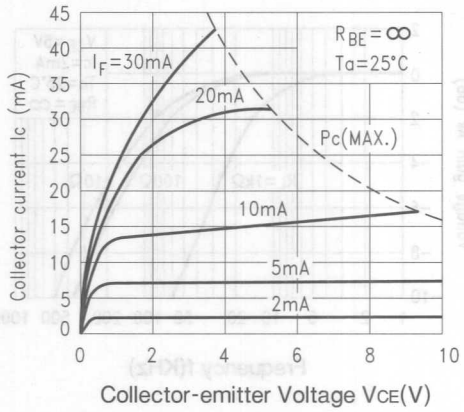


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

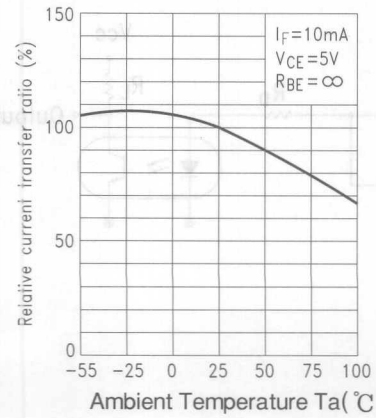


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

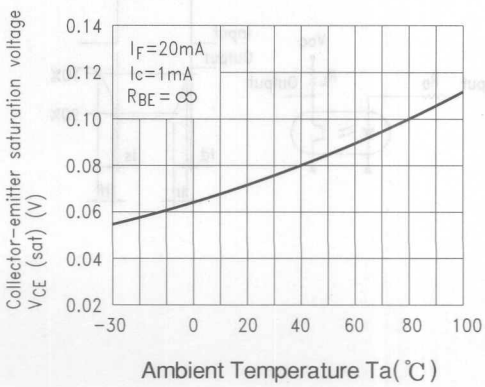


Fig. 9 Collector Dark Current Vs. Ambient Temperature

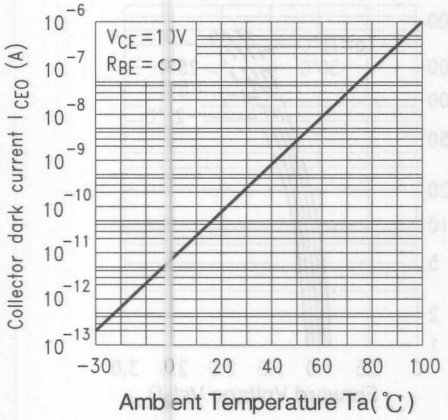


Fig. 10 Response Time Vs. Load Resistance

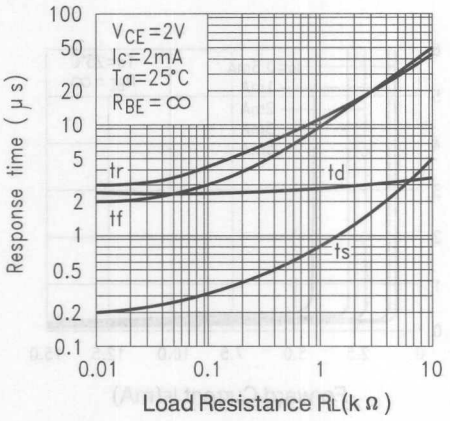
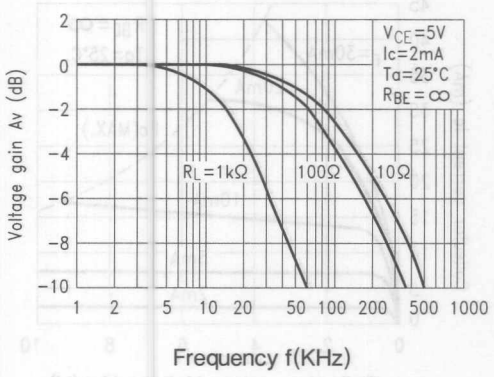
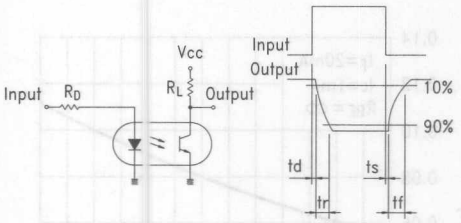


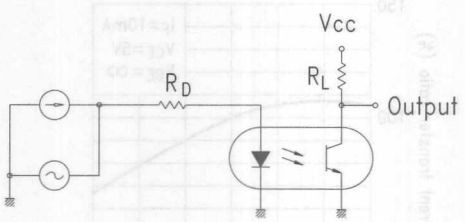
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



High Isolation Voltage Type, General Purpose

LTV713V/LTV713VS/LTV713VM

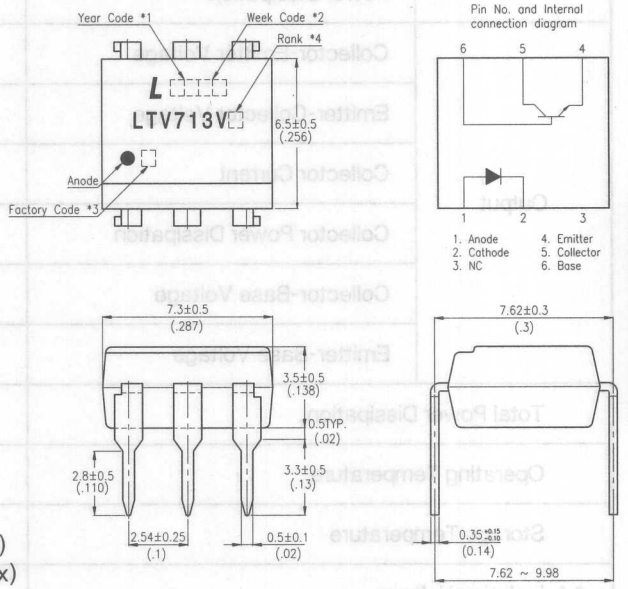
Features

- Directly connectable to TTL
- Current transfer ratio
  (CTR : MIN. 50% at I_F = 5mA, V_{CE} = 5V)
- Low collector dark current
  (I_{CEO} : MAX. 10^{-7}A at V_{CE} = 20V)
- High input-output isolation voltage :
  (Viso : 5,000V_{rms})
- UL approved (No. E113898)
- TUV approved (No. R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182727)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303968)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- Options Available :
  - Leads with 0.4" (10.16mm) spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  - VDE 0884 Approvals (Add "-V" Suffix)

Applications

1. System appliances, measuring instruments.
2. Registers, copiers, automatic vending machines.
3. Electric home appliances such as fan heaters.
4. Medical instruments, physical and chemical equipments.
5. Signal transmission between circuits of different potentials and impedances.

Package Dimensions



Notes :

1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

PHOTOCOUPLERS

Absolute Maximum Ratings (Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector-Emitter Voltage	V_{CEO}	35	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
	Collector-Base Voltage	V_{CBO}	35	V
	Emitter-Base Voltage	V_{EBO}	6	V
Total Power Dissipation		P_{tot}	170	mW
Operating Temperature		T_{opr}	-25~+100	℃
Storage Temperature		T_{stg}	-40~+125	℃
* 1. Isolation Voltage		V_{iso}	5	kVrms
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute, R.H. = 40 ~ 60%
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds

Electrical/Optical Characteristics

(Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V, R_{BE}=∞
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	2.5	—	30	mA	I_F=5mA, V_{CE}=5V
	* Current Transfer Ratio	CTR	50	—	600	%	
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	I_F=20mA, I_C=1mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	—	80	—	KHz	V_{CE}=5V, I_F=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	4	18	μs	V_{CE}=2V, I_F=2mA R_L=100Ω
	Response Time (Fall)	t_f	—	3	18	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

■ Supplement

Rank Table Of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV 713V A	A	80~160
LTV 713V B	B	130~260
LTV 713V C	C	200~400
LTV 713V	A or B or C or No Mark	50~600

Conditions	I_F=10mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

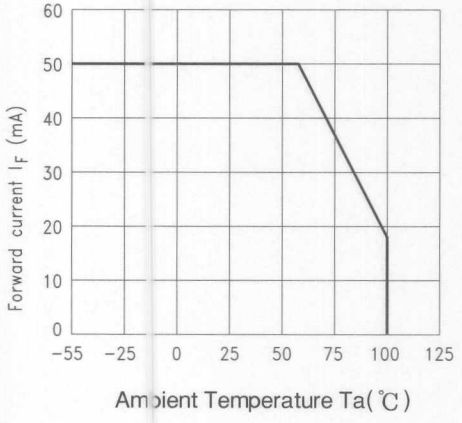


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

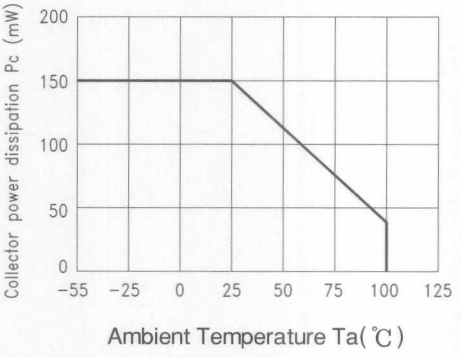


Fig. 3 Frequency Response

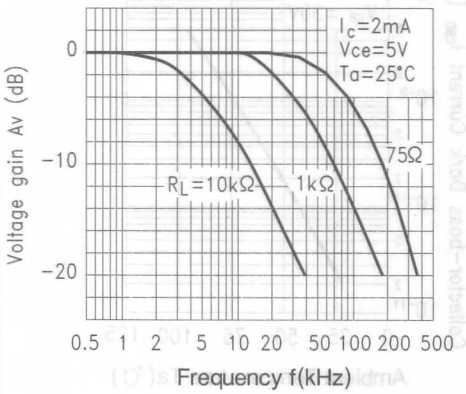


Fig. 4 Forward Current Vs. Forward Voltage

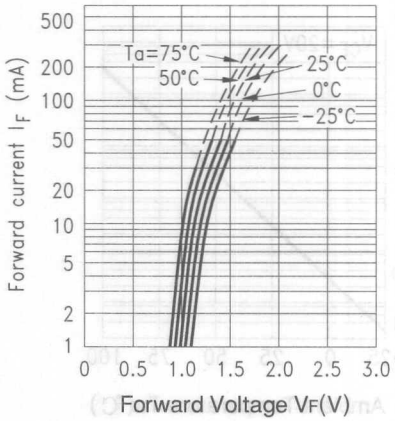


Fig. 5 Current Transfer Ratio Vs. Forward Current

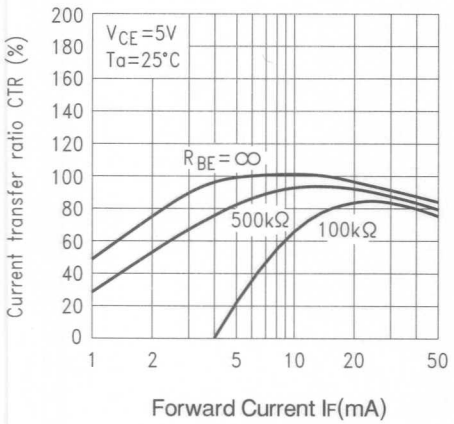


Fig. 6 Collector Current Vs. Collector-emitter Voltage

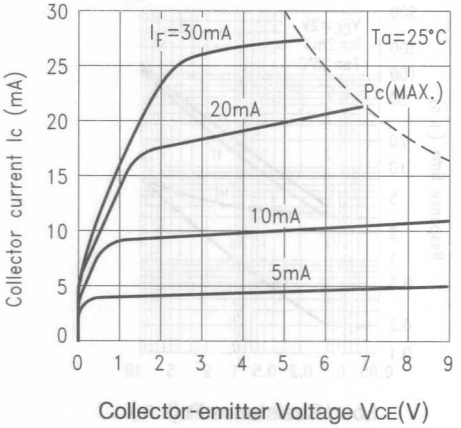


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

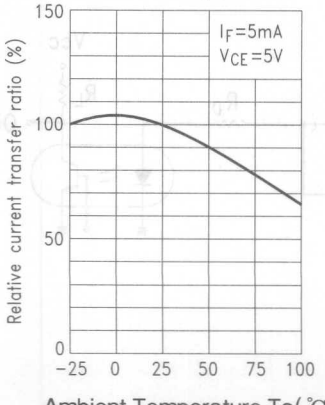


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

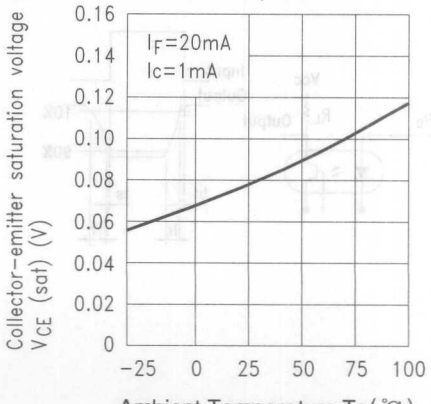


Fig. 9 Collector Dark Current Vs. Ambient Temperature

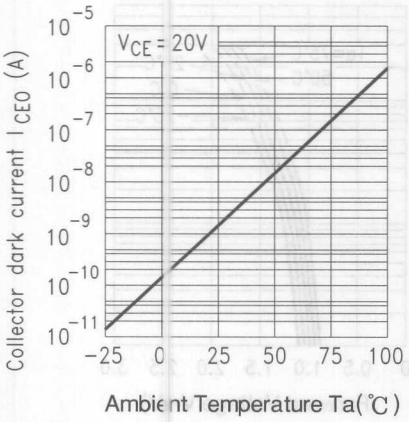


Fig. 10 Collector-Base Dark Current Vs. Ambient Temperature

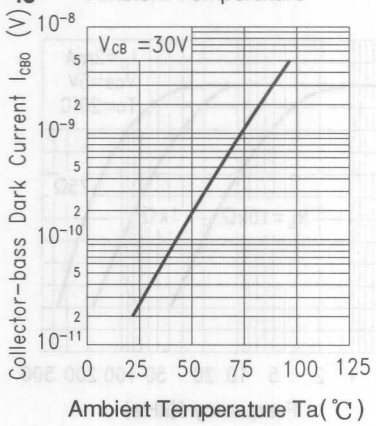
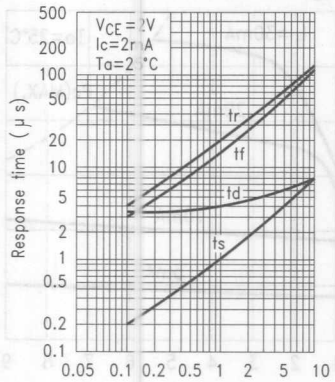
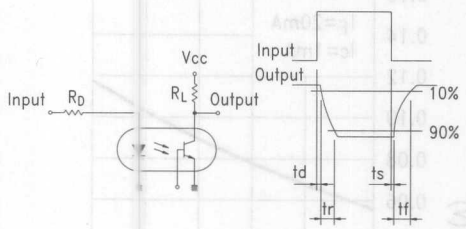


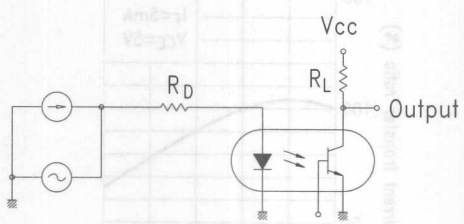
Fig. 11 Response Time Vs. Load Resistance



Test Circuit For Response Time



Test Circuit For Frequency Response



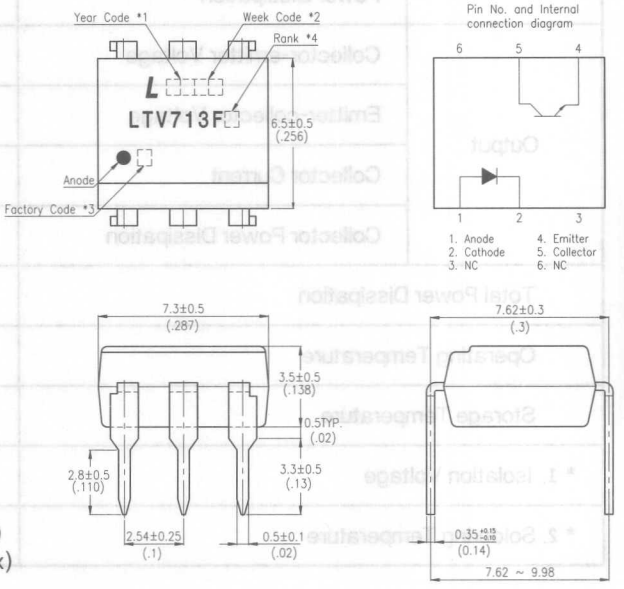
High Collector-Emitter Voltage Type

LTV713F/LTV713FS/LTV713FM

Features

- Directly connectable to TTL
- Current transfer ratio
  (CTR : MIN. 50% at I_F = 5mA, V_{CE} = 5V)
- Low collector dark current
  (I_{CEO} : MAX. 10^{-7}A at V_{CE} = 20V)
- High input-output isolation voltage :
  (Viso : 5,000V_{rms})
- UL approved (No. E113898)
- TUV approved (No. R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 182727)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303968)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- Options Available :
  - Leads with 0.4" (10.16mm) spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  - VDE 0884 Approvals (Add "-V" Suffix)

Package Dimensions



Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

Applications

1. System appliances, measuring instruments.
2. Registers, copiers, automatic vending machines.
3. Electric home appliances such as fan heaters.
4. Medical instruments, physical and chemical equipments.
5. Signal transmission between circuits of different potentials and impedances.

Absolute Maximum Ratings (Ta=25 ℃)

	Parameter	Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector-emitter Voltage	V_{CEO}	35	V
	Emitter-collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	170	mW
Operating Temperature		T_{opr}	-25~+100	℃
Storage Temperature		T_{stg}	-40~+125	℃
* 1. Isolation Voltage		V_{iso}	5	KV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
  (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
  (2) The isolation voltage tester with zero-cross circuit shall be used.
  (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds.

Electrical/Optical Characteristics

(Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	* Current Transfer Ratio	CTR	50	100	600	%	I_F=5mA, V_{CE}=5V
	Collector Current	I_C	2.5	—	30	mA	I_F=5mA, V_{CE}=5V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	I_F=20mA, I_C=1mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	—	80	—	KHz	V_{CE}=5V, I_F=2mA R_L=100 Ω, -3dB
	Response Time (Rise)	t_r	—	4	18	μs	V_{CE}=2V, I_F=2mA R_L=100 Ω
	Response Time (Fall)	t_f	—	3	18	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

PHOTOCOUPLERS

■ Supplement

Rank Table Of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV713F A	A	80~160
LTV713F B	B	130~260
LTV713F C	C	200~400
LTV713F	A or B or C or No Mark	50~600

Conditions	I_F=10mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

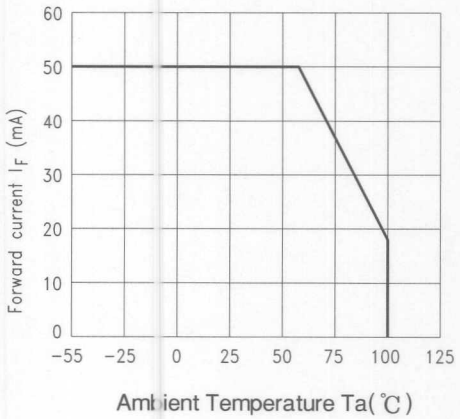


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

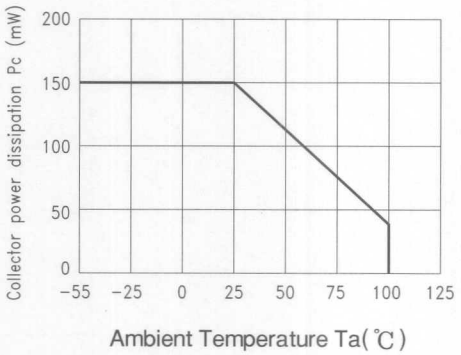


Fig. 3 Frequency Response

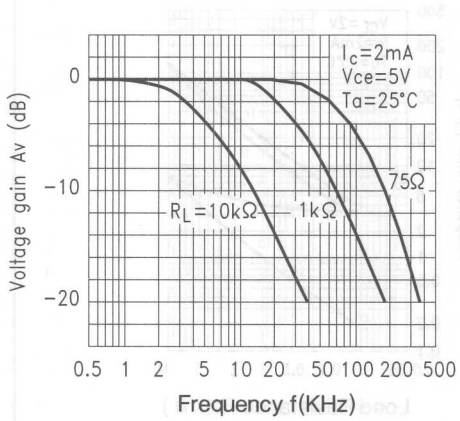


Fig. 4 Forward Current Vs. Forward Voltage

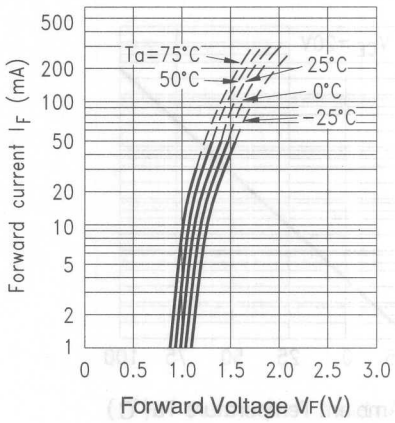


Fig. 5 Current Transfer Ratio Vs. Forward Current

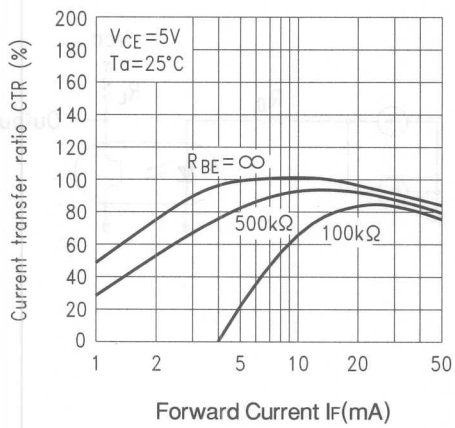


Fig. 6 Collector Current Vs. Collector-emitter Voltage

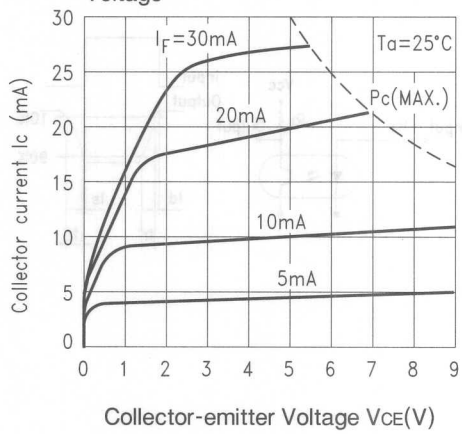


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

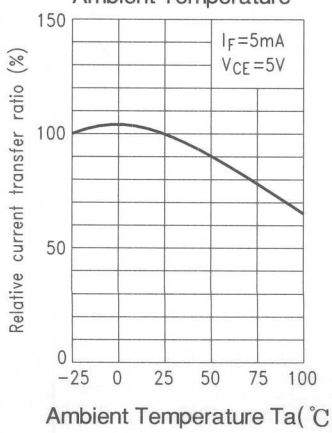


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

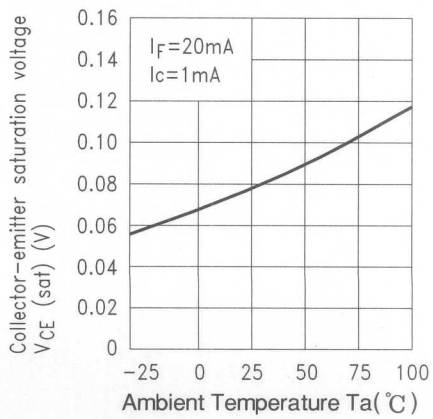


Fig. 9 Collector Dark Current Vs. Ambient Temperature

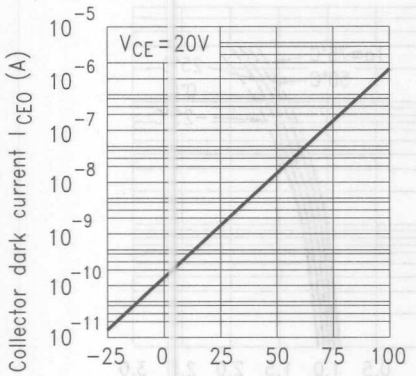
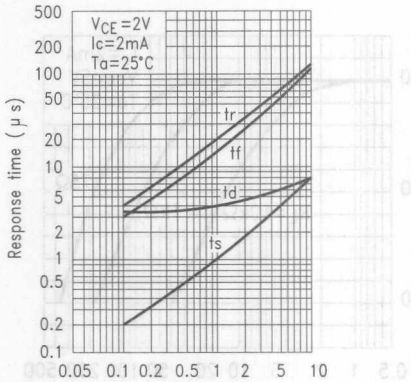
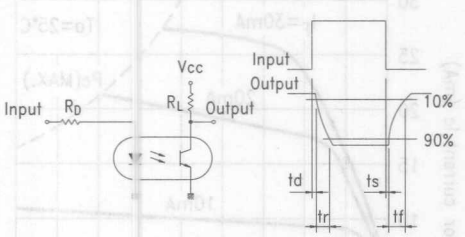


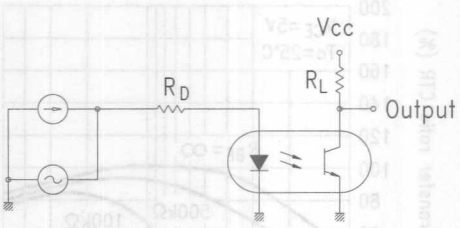
Fig. 10 Response Time Vs. Load Resistance



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

Acinput Type Photocoupler

LTV814/LTV824/LTV844
LTV814S/LTV824S/LTV844S
LTV814M/LTV824M/LTV844M

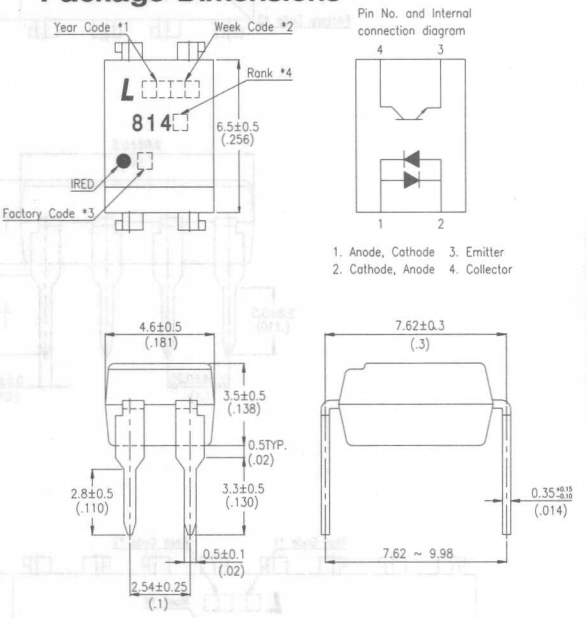
Features

- AC input response
- High input-output isolation voltage :
  (Viso : 5,000Vrms)
- Low collector dark current
  (I_{CEO} : MAX. 10^{-7}A at V_{CE} = 20V)
- Current transfer ratio
  (CTR : MIN. 20% at I_F = ± 1mA, V_{CE} = 5V)
- Compact dual-in-line package
  LTV814 : 1-channel type
  LTV824 : 2-channel type
  LTV844 : 4-channel type
- UL approved (No. E113898)
- TUV approved (No. R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 193422)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303986)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- Options Available :
  - Leads with 0.4" (10.16mm) Spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - Tape and Reel of Type II for SMD(Add"-TA1" Suffix)
  - VDE 0884 Approvals (Add "-V" Suffix)

Applications

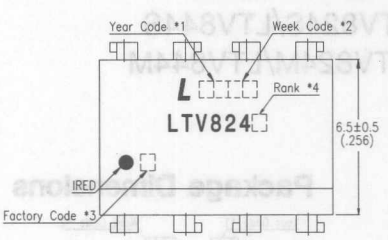
1. Telephone sets, telephone exchangers.
2. Sequence controllers.
3. System appliances, measuring instruments.
4. Signal transmission between circuits of different potentials and impedances.

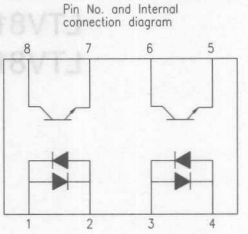
Package Dimensions



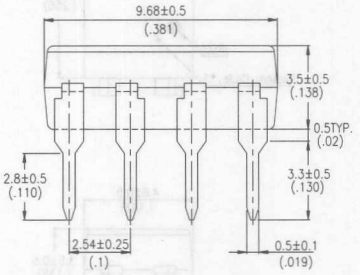
Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

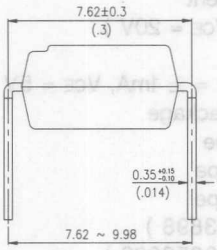
PHOTOCOUPLERS

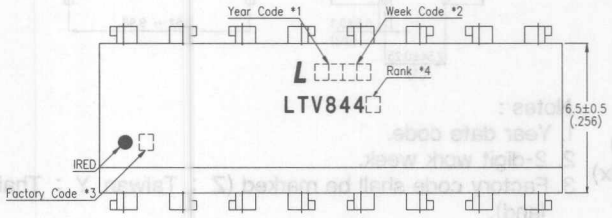


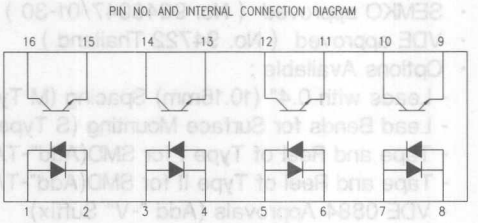


1,3. Anode, Cathode 5,7. Emitter
2,4. Cathode, Anode 6,8. Collector

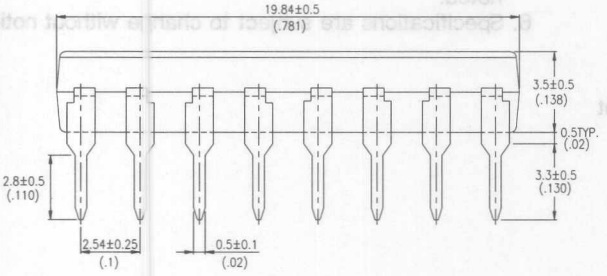


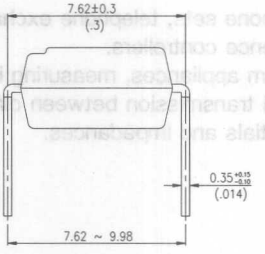






1,3,5,7. Anode,Cathode 9,11.13.15. Emitter
2,4,6,8. Cathode,Anode 10,12,14,16. Collector





Absolute Maximum Ratings (Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	± 50	mA
	Power Dissipation	P	70	mW
Output	Collector-Emitter Voltage	V_{CEO}	35	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-30~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
* 1. Isolation Voltage		V_{iso}	5	KV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds.

Electrical/Optical Characteristics (Ta=25℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	$I_F = \pm 20mA$
	Terminal Capacitance	C_t	—	50	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	0.2	—	3	mA	$I_F = \pm 1mA$, V_{CE}=5V
	* Current Transfer Ratio	CTR	20	—	300	%	$I_F = \pm 1mA$, V_{CE}=5V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	$I_F = \pm 20mA$, V_{CE}=1V
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	15	80	—	KHz	V_{CE}=5V, I_F=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	4	18	μs	V_{CE}=2V, I_F=2mA R_L=100Ω
	Response Time (Fall)	t_f	—	3	18	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

Typical Electrical/Optical Characteristic Curves (25℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

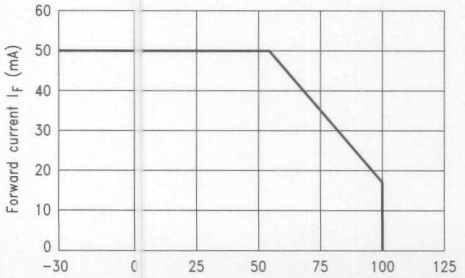


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

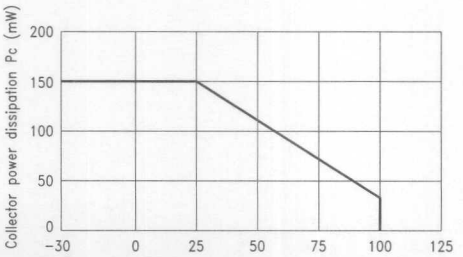


Fig. 3 Collector-emitter Sturation Voltage Vs. Forward Current

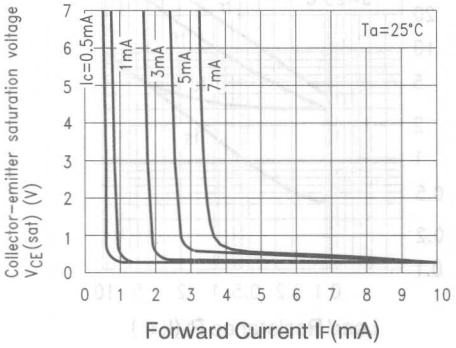


Fig. 4 Forward Current Vs. Forward Voltage

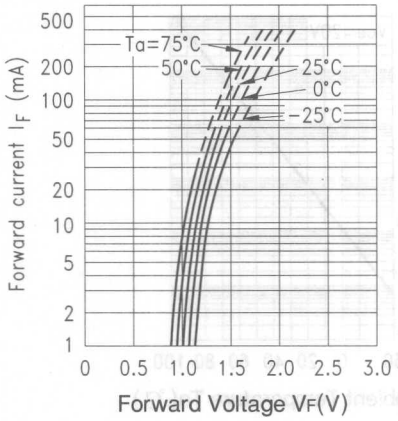


Fig. 5 Current Transfer Ratio Vs. Forward Current

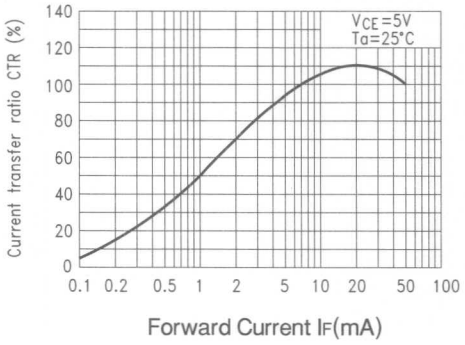


Fig. 6 Collector Current Vs. Collector-emitter Voltage

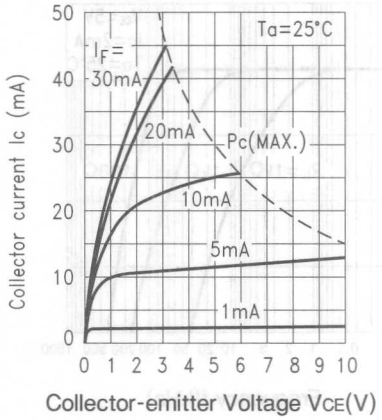


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

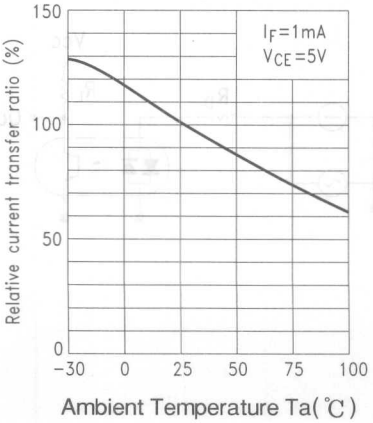


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

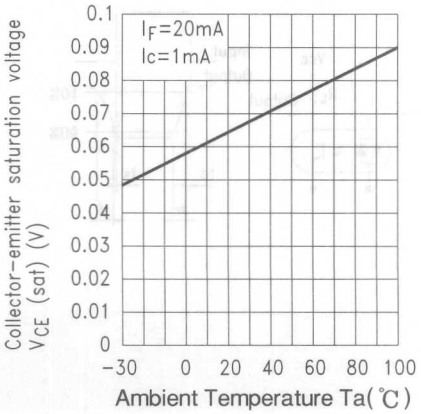


Fig. 9 Collector Dark Current Vs. Ambient Temperature

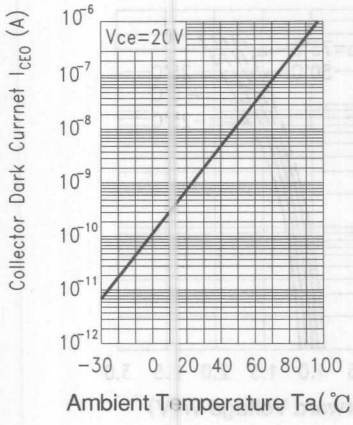


Fig. 10 Response Time Vs. Load Resistance

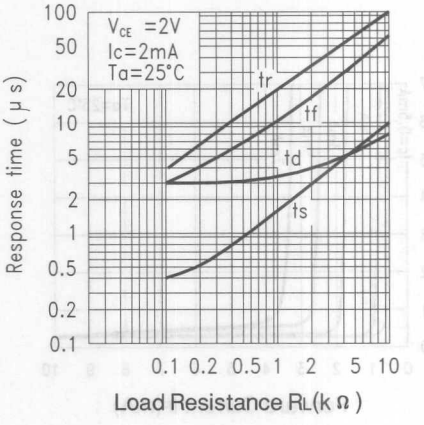
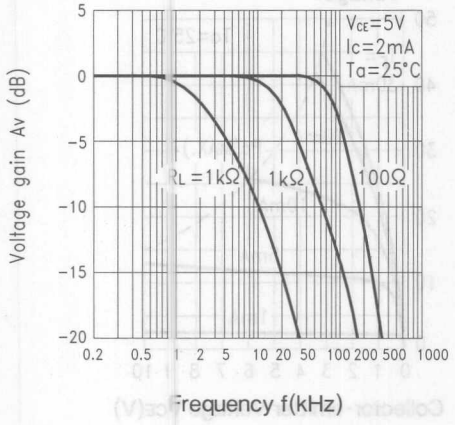
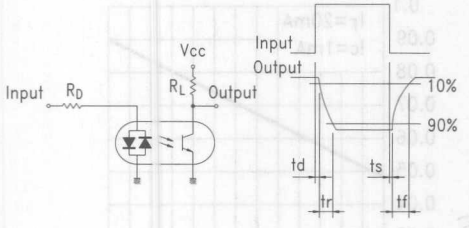


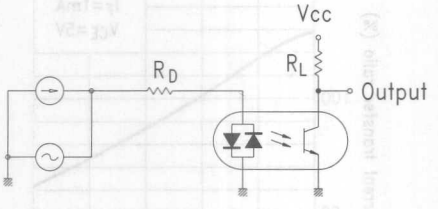
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



AC Input Type Photocoupler

LTV814H/LTV824H/LTV844H
LTV814HS/LTV824HS/LTV844HS
LTV814HM/LTV824HM/LTV844HM

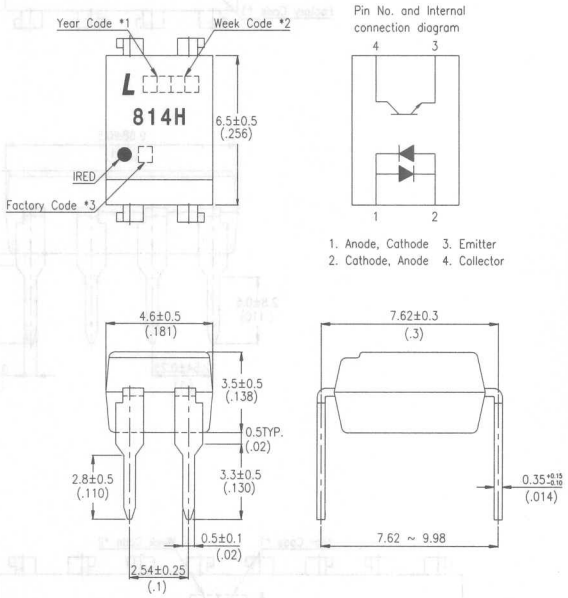
Features

- AC input response
- High input current
  (I_F : MAX. 150mA)
- High input-output isolation voltage :
  (V_{iso} : 5,000V_{rms})
- Low collector dark current
  (I_{CEO} : MAX. 10^{-7}A at V_{CE} = 20V)
- Current transfer ratio
  (CTR : MIN. 20% at I_F = ± 100mA, V_{CE} = 2V)
- Compact dual-in-line package
  LTV814H : 1-channel type
  LTV824H : 2-channel type
  LTV844H : 4-channel type
- UL approved (No. E113898) only 814H
- CSA approved (No. LR91533) only 814H
- VDE approved (No. 94722 Thailand)
- Options Available :
  - Leads with 0.4" (10.16mm) Spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  - VDE 0884 Approvals (Add "-V" Suffix)

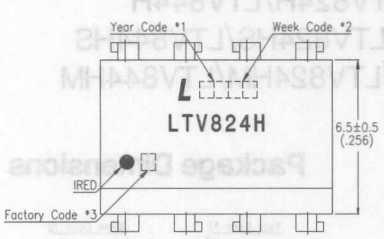
Applications

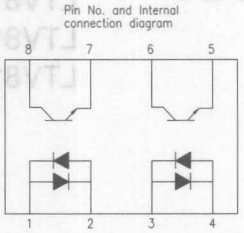
1. Telephone sets.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

Package Dimensions

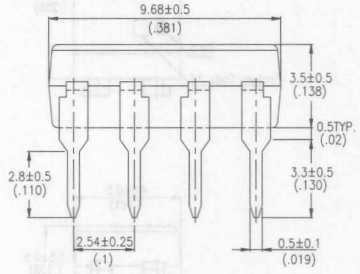


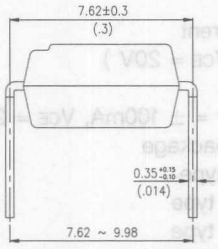
Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. Rank shall be or shall not be marked.
5. All dimensions are in millimeters (inches).
6. Tolerance is ± 0.25mm (.010") unless otherwise noted.
7. Specifications are subject to change without notice.

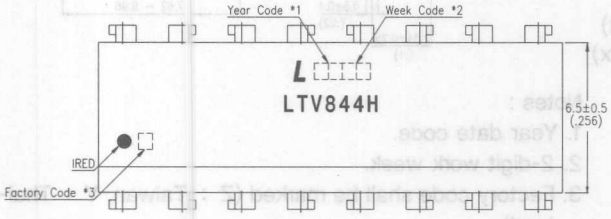


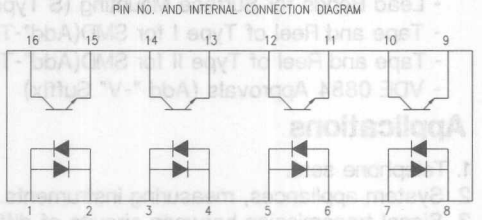


1,3. Anode, Cathode 5,7. Emitter
2,4. Cathode, Anode 6,8. Collector

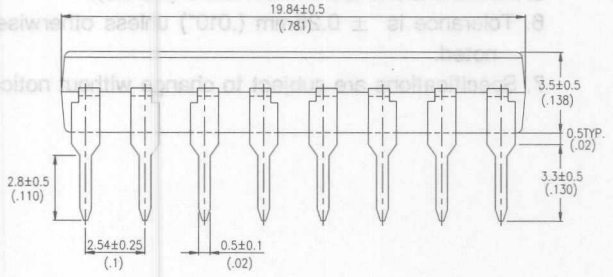


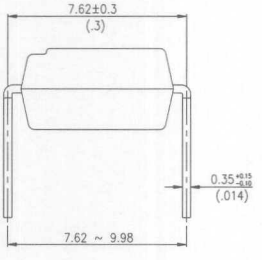






1,3,5,7. Anode,Cathode 9,11.13.15. Emitter
2,4,6,8. Cathode,Anode 10,12,14,16. Collector





Absolute Maximum Ratings (Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	±150	mA
	Power Dissipation	P	230	mW
Output	Collector-Emitter Voltage	V_{CEO}	35	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	80	mA
	Collector Power Dissipation	P_C	160	mW
Total Power Dissipation		P_{tot}	320	mW
* 1. Isolation Voltage		V_{iso}	5000	V_{rms}
Operating Temperature		T_{opr}	-30~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds.

Electrical/Optical Characteristics (Ta=25℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.4	1.7	V	I_F= ± 100mA
	Terminal Capacitance	C_t	—	50	400	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	0.2	—	80	mA	I_F=100mA, V_{CE}=2V
	* Current Transfer Ratio	CTR	20	—	30	%	
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	I_F= ± 100mA, I_C=1mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	15	80	—	KHz	V_{CE}=5V, I_C=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	4	18	μs	V_{CE}=2V, I_C=2mA R_L=100Ω
	Response Time (Fall)	t_f	—	3	18	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

Typical Electrical/Optical Characteristic Curves (25℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

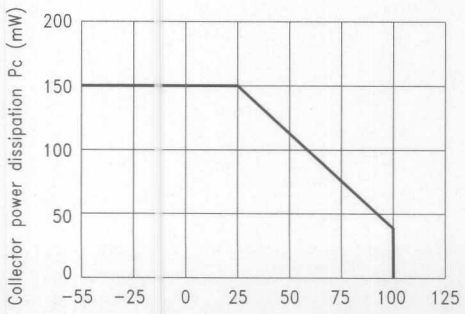


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

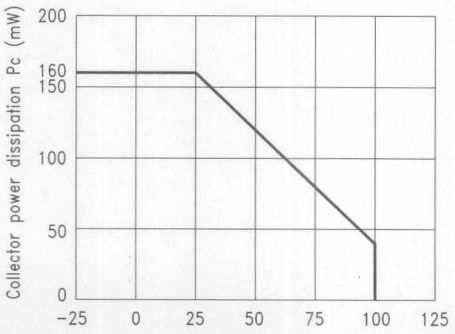


Fig. 3 Collector-Emitter Satruation Voltage Vs. Forward Current

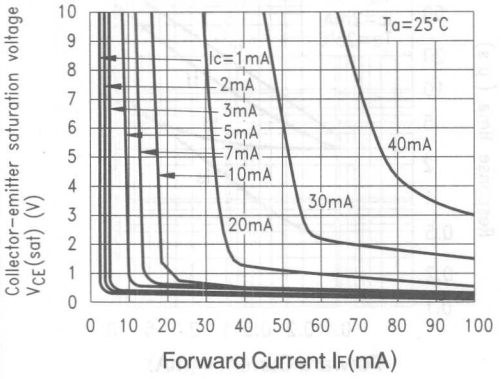


Fig. 4 Forward Current Vs. Forward Voltage

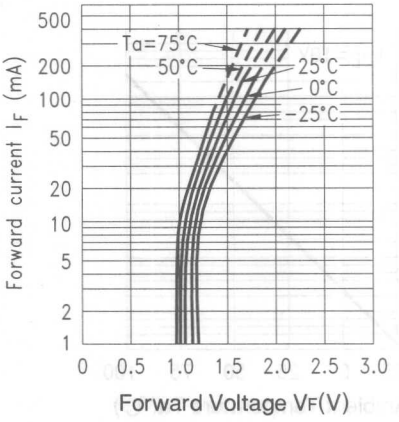


Fig. 5 Current Transfer Ratio Vs. Forward Current

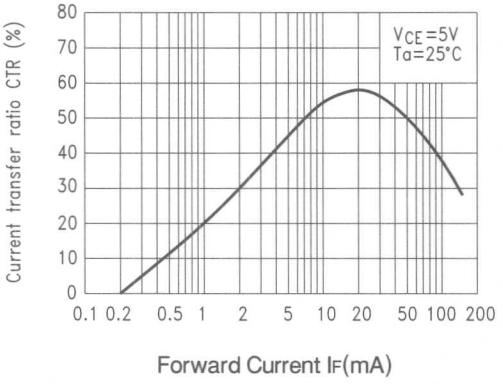


Fig. 6 Collector Current Vs. Collector-emitter Voltage

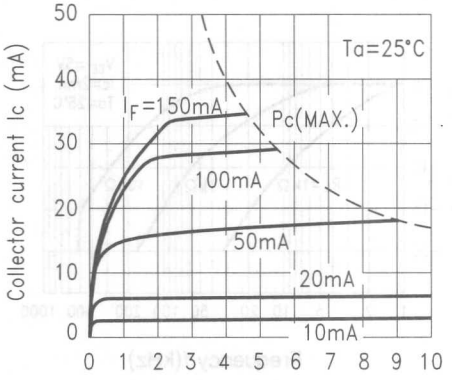


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

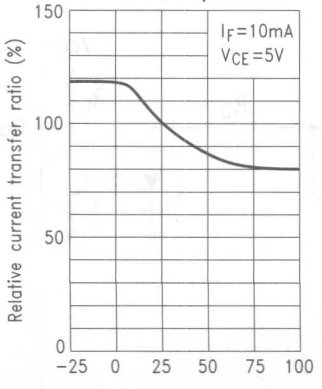


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

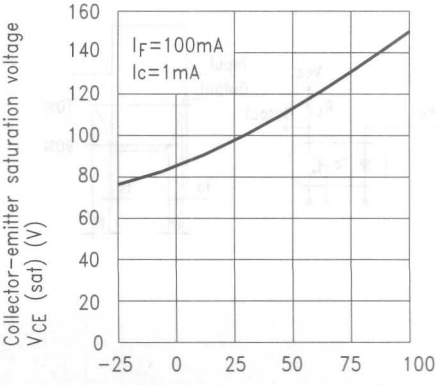


Fig. 9 Collector Dark Current Vs. Ambient Temperature

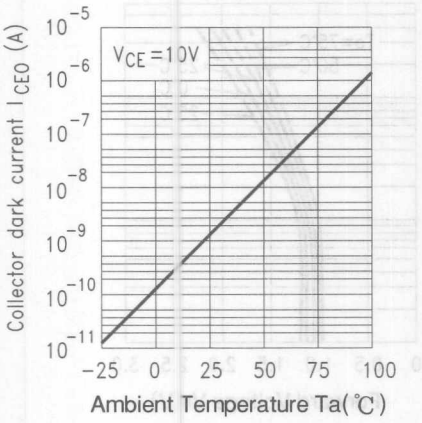


Fig. 10 Response Time Vs. Load Resistance

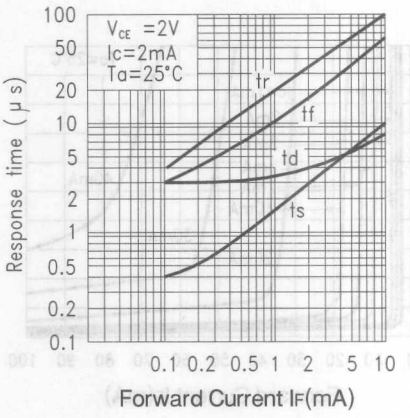
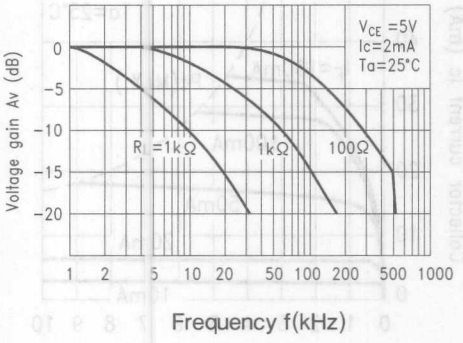
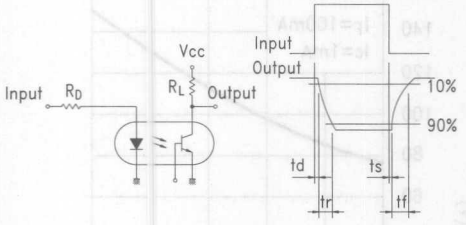


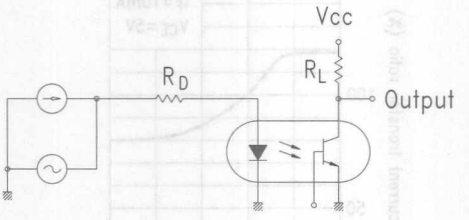
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

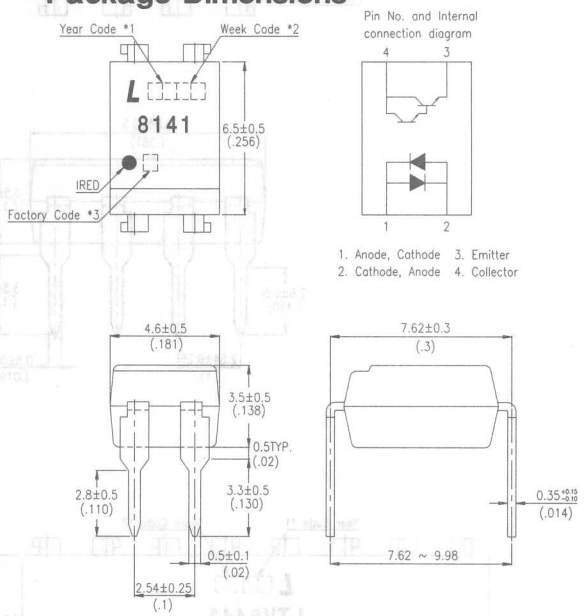
High Transfer Efficiency AC Input Type Photocoupler

LTV8141/LTV8241/LTV8441
LTV8141S/LTV8241S/LTV8441S
LTV8141M/LTV8241M/LTV8441M

Features

- AC input response
- High current transfer ratio
  (CTR : MIN. 600% at I_F = ± 1mA, V_{CE} = 2V)
- High input-output isolation voltage :
  (Viso : 5,000V_{rms})
- Compact dual-in-line package
  LTV8141 : 1-channel type
  LTV8241 : 2-channel type
  LTV8441 : 4-channel type
- UL approved (No. E113898)
- TUV approved (No. R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 193422)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303986)
- SEMKO approved (No. 9646047/01-30)
- Options Available :
  - Leads with 0.4" (10.16mm) Spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - Tape and Reel of Type II for SMD(Add"-TA1" Suffix)

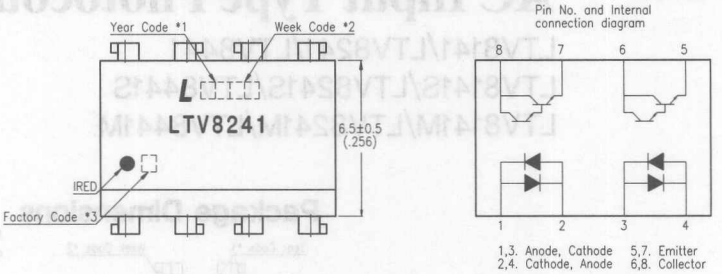
Package Dimensions

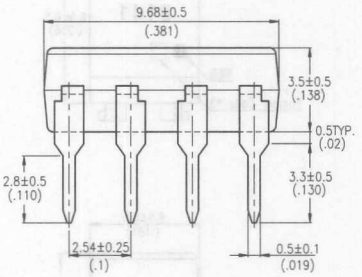


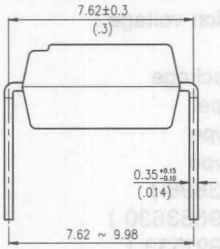
Applications

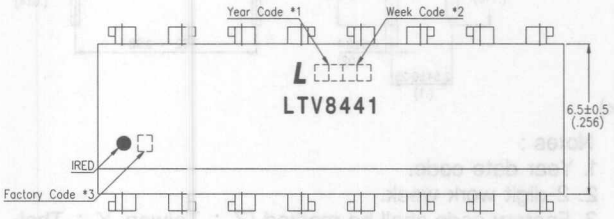
1. System appliances, measuring instruments.
2. Industrial robots.
3. Copiers, automatic vending machines.
4. Signal transmission between circuitsof different potentials and impedances.

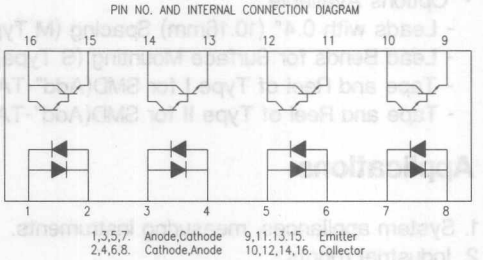
Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

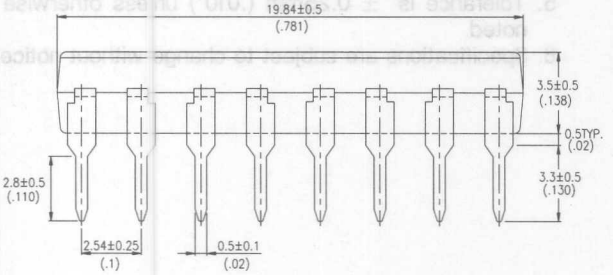

Year Code *1
Week Code *2
LTV8241
6.5±0.5
(.256)
IRED
Factory Code *3
Pin No. and Internal
connection diagram
8 7 6 5
1 2 3 4
1,3. Anode, Cathode 5,7. Emitter
2,4. Cathode, Anode 6,8. Collector

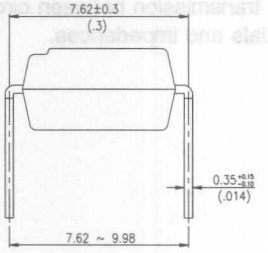

9.68±0.5
(.381)
3.5±0.5
(.138)
0.5TYP.
(.02)
3.3±0.5
(.130)
2.8±0.5
(.110)
2.54±0.25
(.1)
0.5±0.1
(.019)


7.62±0.3
(.3)
0.35 +0.15 -0.10
(.014)
7.62 ~ 9.98


Year Code *1
Week Code *2
LTV8441
6.5±0.5
(.256)
IRED
Factory Code *3


PIN NO. AND INTERNAL CONNECTION DIAGRAM
16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
1,3,5,7. Anode,Cathode 9,11.13.15. Emitter
2,4,6,8. Cathode,Anode 10,12,14,16. Collector


19.84±0.5
(.781)
3.5±0.5
(.138)
0.5TYP.
(.02)
3.3±0.5
(.130)
2.8±0.5
(.110)
2.54±0.25
(.1)
0.5±0.1
(.02)


7.62±0.3
(.3)
0.35 +0.15 -0.10
(.014)
7.62 ~ 9.98

Absolute Maximum Ratings (Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	± 50	mA
	Power Dissipation	P	70	mW
Output	Collector-Emitter Voltage	V_{CEO}	35	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	80	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-30~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
* 1. Isolation Voltage		V_{iso}	5	KV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.

* 2. For 10 seconds.

Electrical/Optical Characteristics (Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F= ± 20mA
	Terminal Capacitance	C_t	—	50	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	1	nA	V_{CE}=10V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	6	—	75	mA	I_F= ± 1mA, V_{CE}=2V
	* Current Transfer Ratio	CTR	600	—	7500	%	I_F= ± 1mA, V_{CE}=2V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.8	1.0	V	I_F= ± 20mA, I_C=5mA
	Isolation Resistance	R_{ISO}	50	100	—	GΩ	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	1	6	—	KHz	V_{CE}=5V, I_C=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	60	300	μs	V_{CE}=2V, I_C=10mA R_L=100Ω
	Response Time (Fall)	t_f	—	53	250	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current Vs. Ambient Temperature

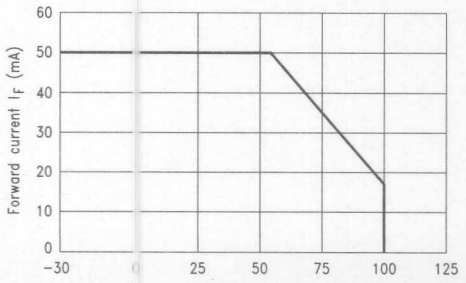


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

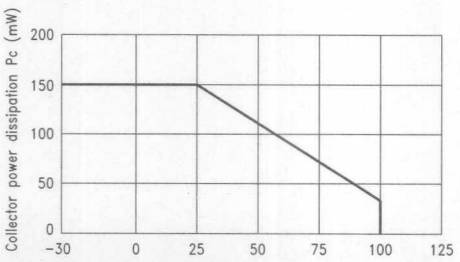


Fig. 3 Collector-emitter Saturation Voltage Vs. Forward Current

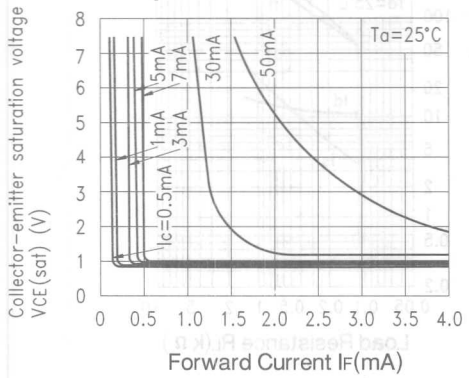


Fig. 4 Forward Current Vs. Forward Voltage

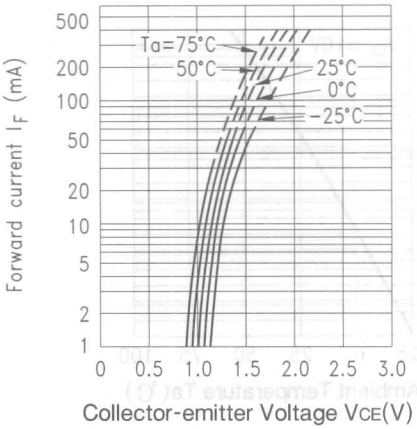


Fig. 5 Current Transfer Ration Vs. Forward Current

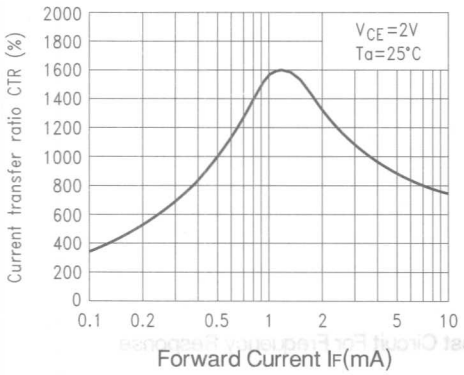


Fig. 6 Collector Current Vs. Collector-emitter Voltage

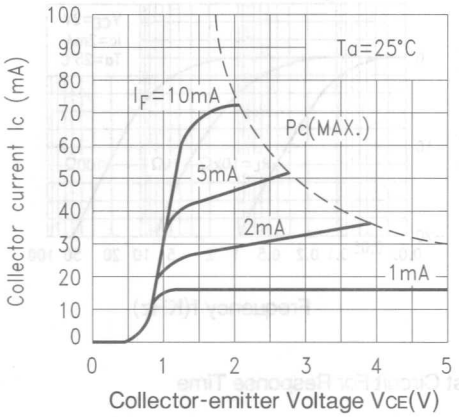


Fig. 7 Relative Current Transfer Ratio Vs. Ambient Temperature

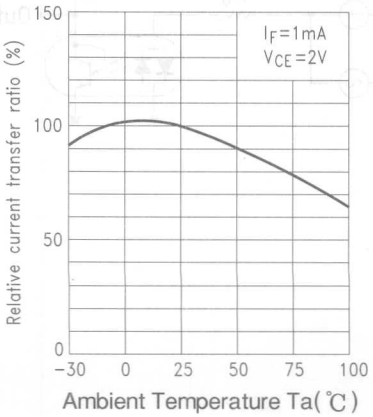


Fig. 8 Collector-emitter Saturation Voltage Vs. Ambient Temperature

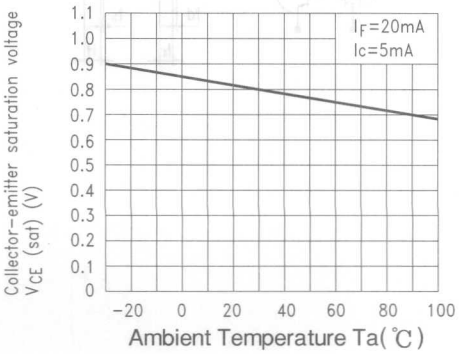


Fig. 9 Collector Dark Current Vs. Ambient Temperature

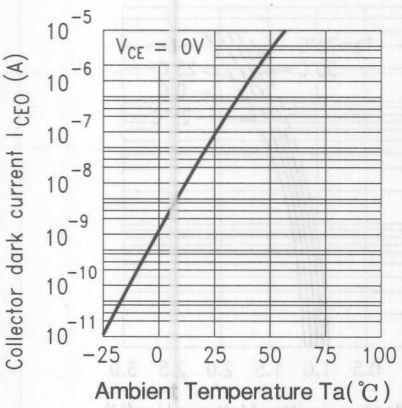


Fig. 10 Response Time Vs. Load Resistance

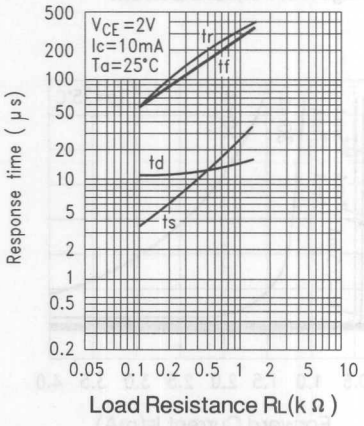
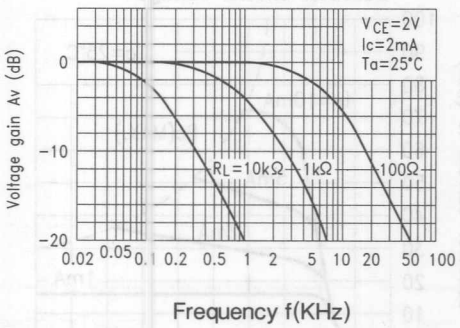
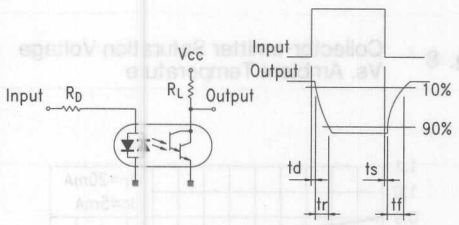


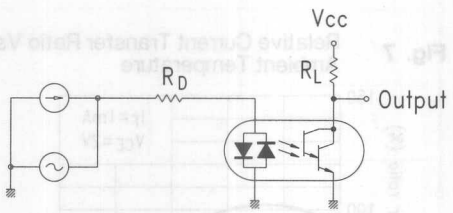
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

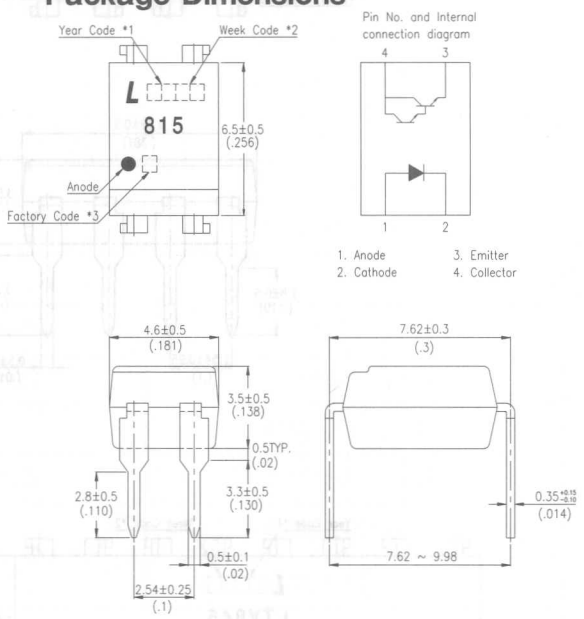
High Transfer Efficiency Type Photocoupler

LTV815/LTV825/LTV845
LTV815S/LTV825S/LTV845S
LTV815M/LTV825M/LTV845M

Features

- High current transfer ratio
  (CTR : MIN. 600% at I_F =1mA, V_{CE} = 2V)
- High input-output isolation voltage :
  (Viso : 5,000V_{rms})
- Compact dual-in-line package
  LTV815 : 1-channel type
  LTV825 : 2-channel type
  LTV845 : 4-channel type
- UL approved (No. E113898)
- TUV approved (No. R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 193422)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303986)
- SEMKO approved (No. 9646047/01-30)
- Options Available :
  - Leads with 0.4" (10.16mm) Spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  - VDE 0884 approvals (Add"-V"Suffix)

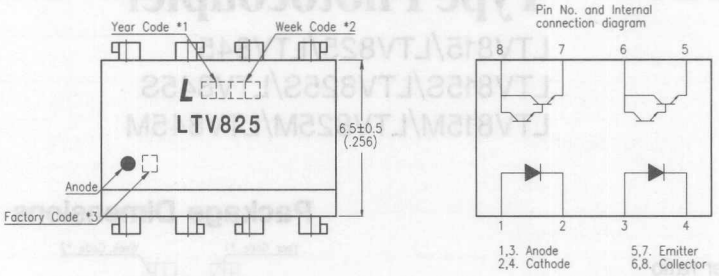
Package Dimensions

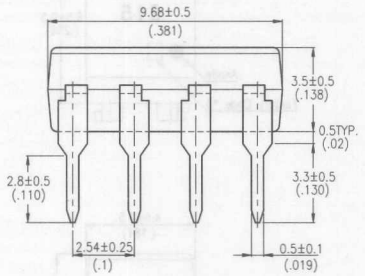


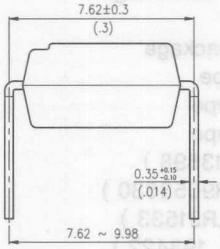
Applications

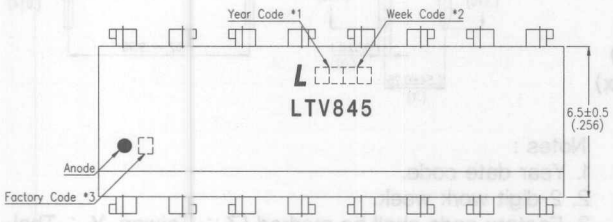
1. Telephone sets, telephone exchangers.
2. Sequence controllers.
3. System appliances, measuring instruments.
4. Signal transmission between circuits of different potentials and impedances.

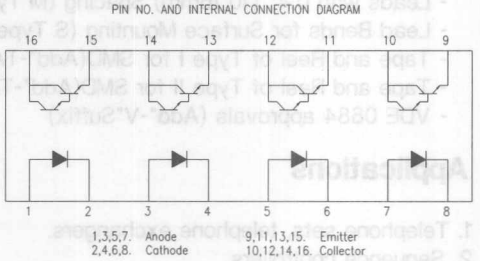
Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. All dimensions are in millimeters (inches).
5. Tolerance is ± 0.25mm (.010") unless otherwise noted.
6. Specifications are subject to change without notice.

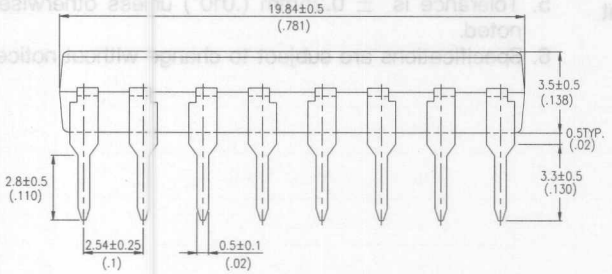

Year Code *1
Week Code *2
L
LTV825
6.5±0.5
(.256)
Anode
Factory Code *3
Pin No. and Internal
connection diagram
8 7 6 5
1 2 3 4
1,3. Anode
2,4. Cathode
5,7. Emitter
6,8. Collector

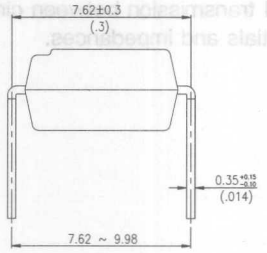

9.68±0.5
(.381)
3.5±0.5
(.138)
0.5TYP.
(.02)
2.8±0.5
(.110)
3.3±0.5
(.130)
2.54±0.25
(.1)
0.5±0.1
(.019)


7.62±0.3
(.3)
0.35 +0.15 −0.10
(.014)
7.62 ~ 9.98


Year Code *1
Week Code *2
L
LTV845
6.5±0.5
(.256)
Anode
Factory Code *3


PIN NO. AND INTERNAL CONNECTION DIAGRAM
16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
1,3,5,7. Anode
2,4,6,8. Cathode
9,11,13,15. Emitter
10,12,14,16. Collector


19.84±0.5
(.781)
3.5±0.5
(.138)
0.5TYP.
(.02)
2.8±0.5
(.110)
3.3±0.5
(.130)
2.54±0.25
(.1)
0.5±0.1
(.02)


7.62±0.3
(.3)
0.35 +0.15 −0.10
(.014)
7.62 ~ 9.98

Absolute Maximum Ratings (Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector-Emitter Voltage	V_{CEO}	35	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	80	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-30~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
* 1. Isolation Voltage		V_{iso}	5	KV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.

* 2. For 10 seconds.

Electrical/Optical Characteristics (Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	1	nA	V_{CE}=10V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	6	—	75	mA	I_F=1mA, V_{CE}=2V
	* Current Transfer Ratio	CTR	600	—	7500	%	I_F=1mA, V_{CE}=2V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.8	1.0	V	I_F=20mA, I_C=5mA
	Isolation Resistance	R_{ISO}	50	100	—	GΩ	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	1	6	—	KHz	V_{CE}=5V, I_C=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	60	300	μs	V_{CE}=2V, I_C=10mA R_L=100Ω
	Response Time (Fall)	t_f	—	53	250	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current Vs. Ambient Temperature

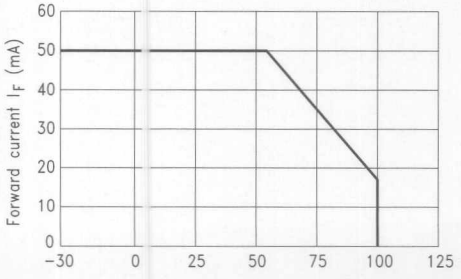


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

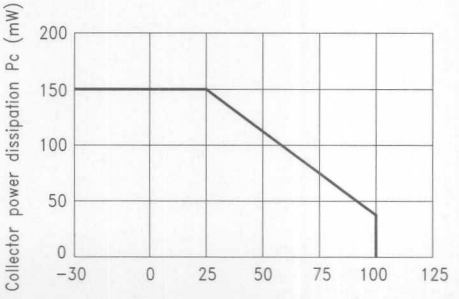


Fig. 3 Collector-emitter Saturation Voltage Vs. Forward Current

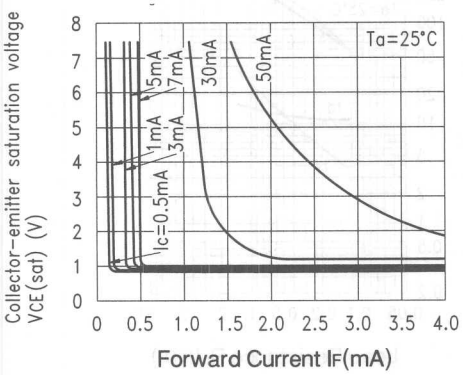


Fig. 4 Forward Current Vs. Forward Voltage

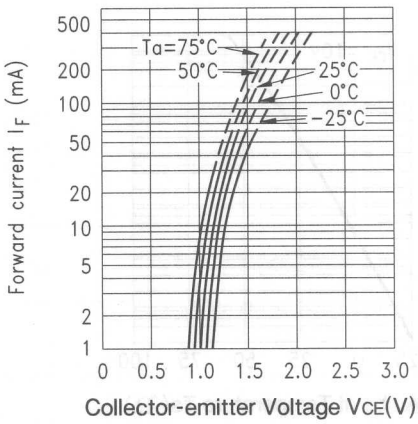


Fig. 5 Current Transfer Ration Vs. Forward Current

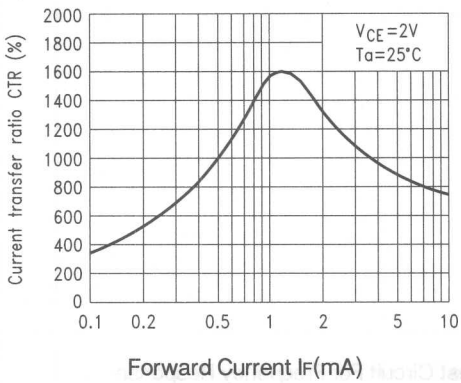


Fig. 6 Collector Current Vs. Collector-emitter Voltage

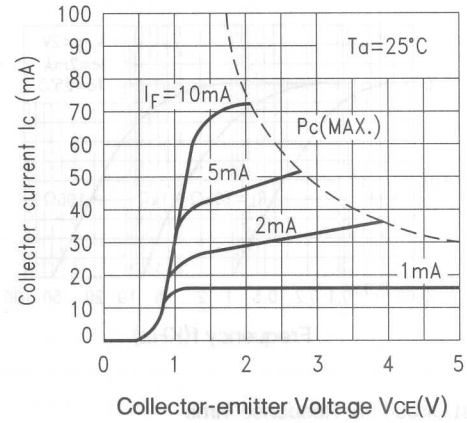


Fig. 7 Relative Current Transfer Ratio Vs. Ambient Temperature

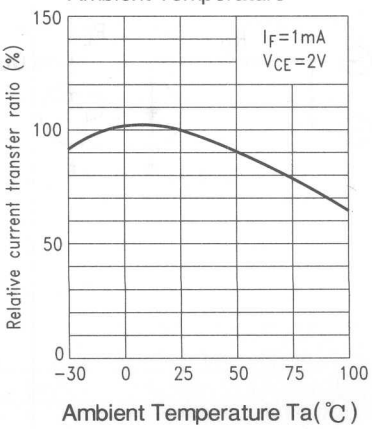
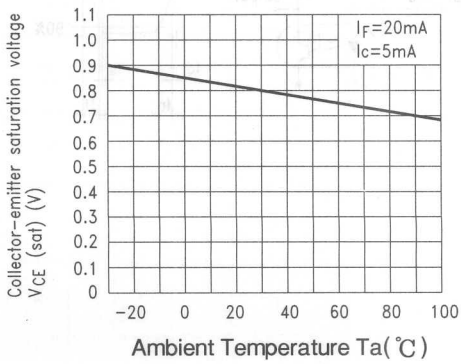


Fig. 8 Collector-emitter Saturation Voltage Vs. Ambient Temperature



PHOTOCOUPLERS

Fig. 9 Collector Dark Current Vs. Ambient Temperature

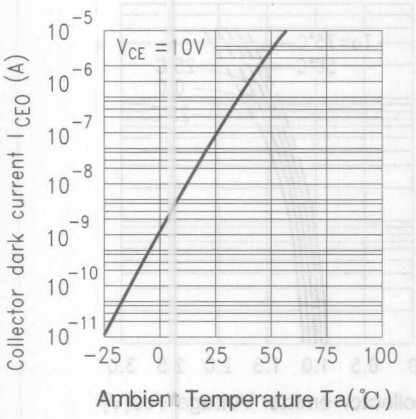


Fig. 10 Response Time Vs. Load Resistance

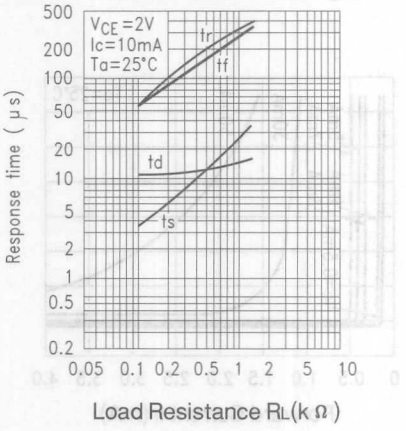
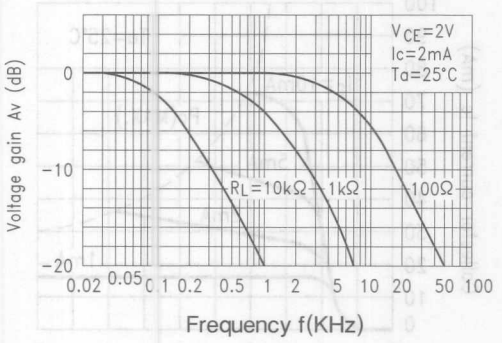
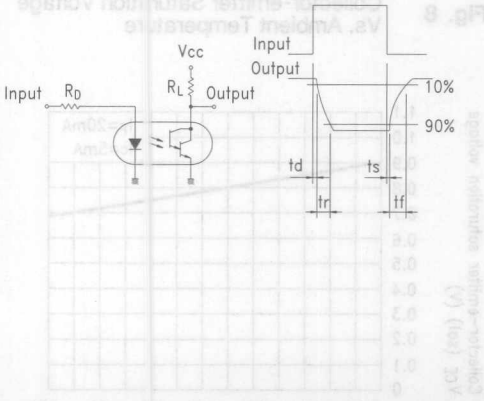


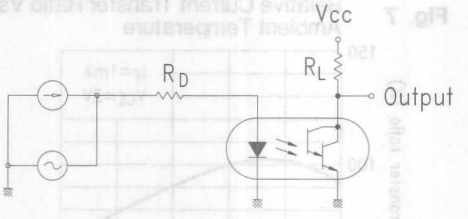
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

High Density Mountiong Type Photocoupler

LTV816V/LTV826/LTV846
LTV816S/LTV826S/LTV846S
LTV816M/LTV826M/LTV846M

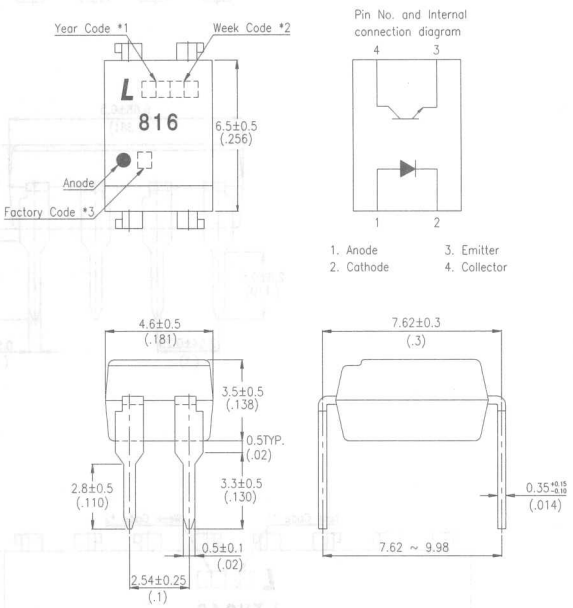
Features

- Current transfer ratio
  (CTR : MIN. 50% at I_F = 5mA, V_{CE} = 5V)
- High input-output isolation voltage :
  (V_{iso} : 5,000V_{rms})
- Compact dual-in-line package
  LTV816 : 1-channel type
  LTV826 : 2-channel type
  LTV846 : 4-channel type
- UL approved in process
- Options Available :
  -Leads with 0.4" (10.16mm) Spacing (M Type)
  -Lead Bends for Surface Mounting (S Type)
  -Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  -Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  -VDE 0884 Approvals (Add "-V" Suffix)

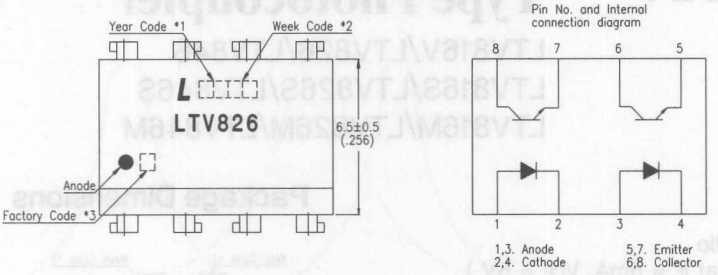
Applications

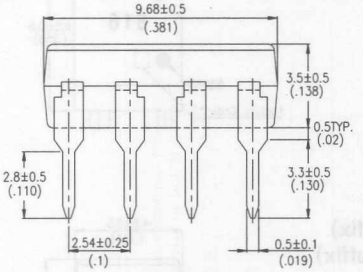
1. Programmable controllers, computers.
2. System appliances, measuring instruments.
3. Signal transmission between circuits of different potentials and impedances.

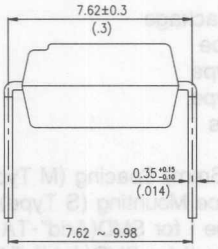
Package Dimensions

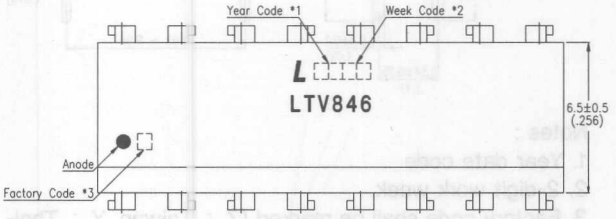


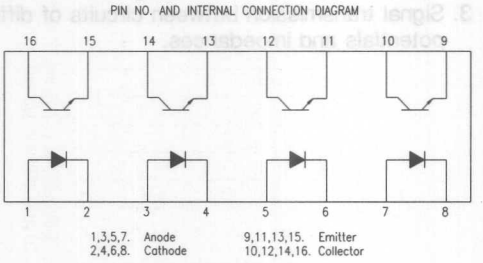
Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. Rank shall be or shall not be marked.
5. All dimensions are in millimeters (inches).
6. Tolerance is ± 0.25mm (.010") unless otherwise noted.
7. Specifications are subject to change without notice.

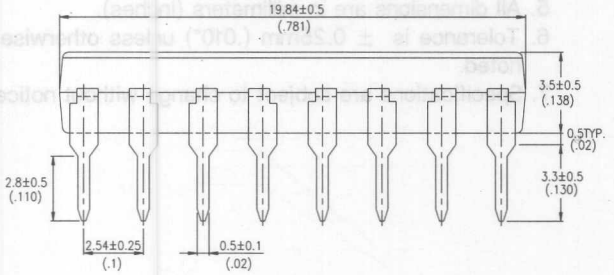

Year Code *1
Week Code *2
L
LTV826
6.5±0.5
(.256)
Anode
Factory Code *3
Pin No. and Internal
connection diagram
8 7 6 5
1 2 3 4
1,3. Anode
2,4. Cathode
5,7. Emitter
6,8. Collector

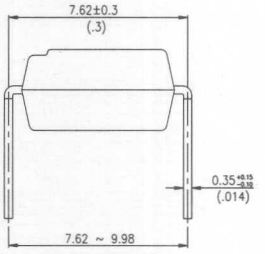

9.68±0.5
(.381)
3.5±0.5
(.138)
0.5TYP.
(.02)
2.8±0.5
(.110)
3.3±0.5
(.130)
2.54±0.25
(.1)
0.5±0.1
(.019)


7.62±0.3
(.3)
0.35 +0.15 −0.10
(.014)
7.62 ~ 9.98


Year Code *1
Week Code *2
L
LTV846
6.5±0.5
(.256)
Anode
Factory Code *3


PIN NO. AND INTERNAL CONNECTION DIAGRAM
16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
1,3,5,7. Anode
2,4,6,8. Cathode
9,11,13,15. Emitter
10,12,14,16. Collector


19.84±0.5
(.781)
3.5±0.5
(.138)
0.5TYP.
(.02)
2.8±0.5
(.110)
3.3±0.5
(.130)
2.54±0.25
(.1)
0.5±0.1
(.02)


7.62±0.3
(.3)
0.35 +0.15 −0.10
(.014)
7.62 ~ 9.98

Absolute Maximum Ratings (Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector - Emitter Voltage	V_{CEO}	80	V
	Emitter - Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	200	mW
*1 Isolation Voltage		V_{iso}	5,000	V_{rms}
Operating Temperature		T_{opr}	-30 ~ +100	℃
Storage Temperature		T_{stg}	-55 ~ +125	℃
*2 Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.

* 2. For 10 seconds.

Electrical/Optical Characteristics (Ta=25℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	–	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	–	–	10	μA	V_R=4V
	Terminal Capacitance	C_t	–	30	250	pF	V=0, f=KHz
Output	Collector Dark Current	I_{CEO}	–	–	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	80	–	–	V	I_C=0.1mA
	Emitter-Collector Breakdown Voltage	BV_{ECO}	6	–	–	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	2.5	–	30	mA	I_F=5mA V_{CE}=5V
	*1 Current Transfer Ratio	CTR	50	–	600	%	
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	–	0.1	0.2	V	I_F=20mA I_C=1mA
	Isolation Resistance	R_{iso}	5×10^{10}	10^{11}	–	Ω	DC500V, 40 ~ 60%R.H.
	Floating Capacitance	C_f	–	0.6	1	pF	V=0, f=1MHz
	Cut-Off Frequency	f_c	–	80	–	kHz	V_{CE}=5V, I_C=2mA R_L=100Ω,-3dB
	Response Time (Rise)	t_r	–	4	18	μS	V_{CE}=2V, I_C=2mA R_L=100Ω
	Response Time (Fall)	t_f	–	3	18	μS	

* $CTR = \frac{I_C}{I_F} \times 100\%$

■ Supplement

Rank Table of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV-816 L	L	50~100
LTV-816 A	A	80~160
LTV-816 B	B	130~260
LTV-816 C	C	200~400
LTV-816 D	D	300~600
LTV-816	L or A or B or C or D	50~600

Conditions	I_F=5mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig.1 Forward Current Vs. Ambient Temperature

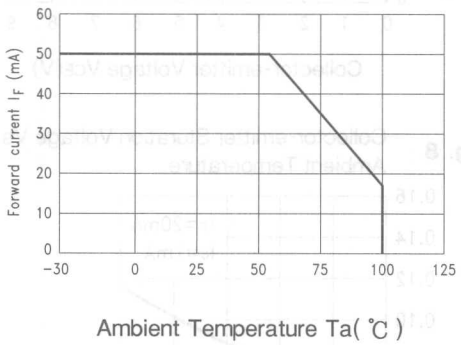


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

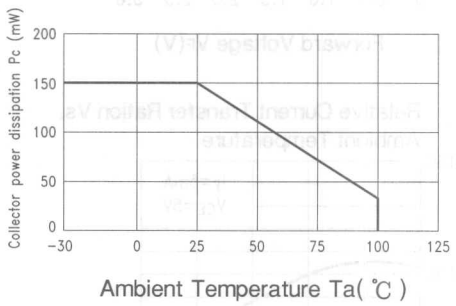


Fig. 3 Collector-Emitter Satruation Voltage Vs. Forward Current

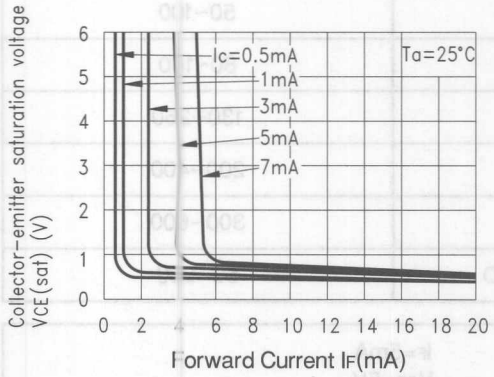


Fig. 4 Current Transfer Ratio Vs. Forward Current

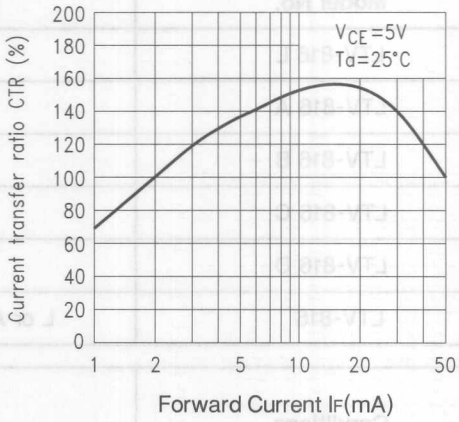


Fig. 5 Forward Current Vs. Forward Voltage

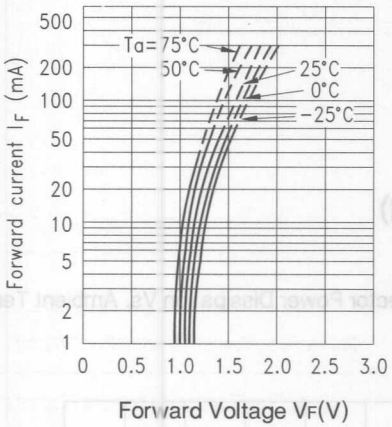


Fig. 6 Collector Current Vs. Collector-emitter Voltage

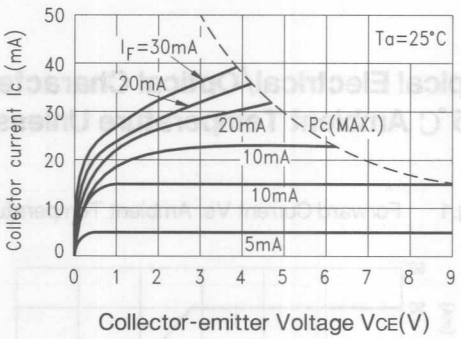


Fig. 7 Relative Current Transfer Ration Vs. Ambient Temperature

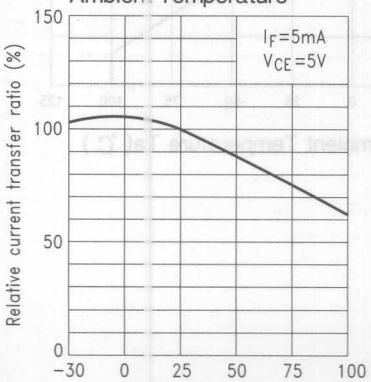


Fig. 8 Collector-emitter Sturation Voltage Vs. Ambient Temperature

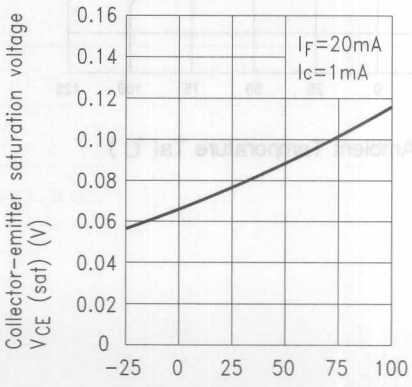


Fig. 9 Collector Dark Current Vs. Ambient Temperature

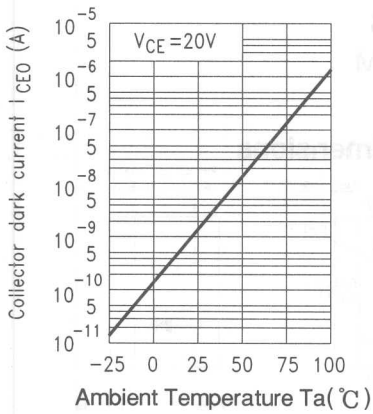


Fig. 10 Response Time Vs. Load Resistance

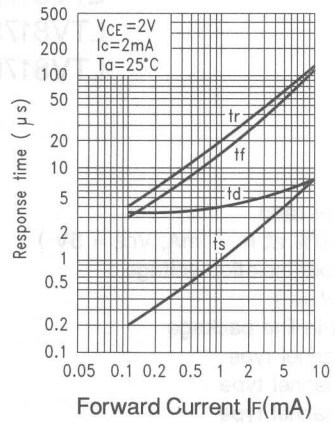
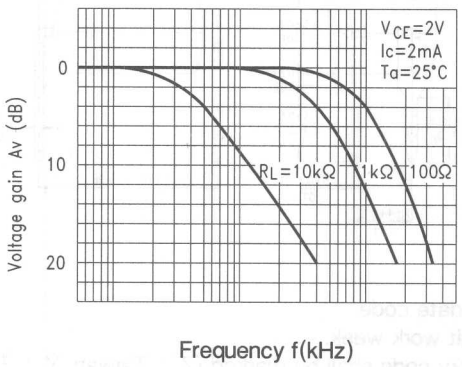
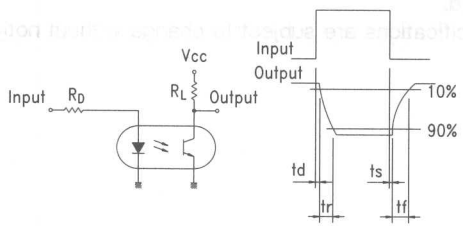


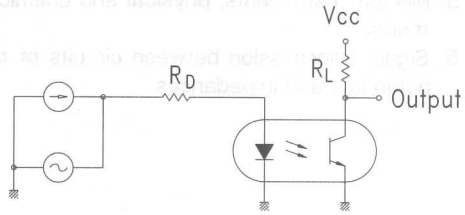
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



PHOTOCOUPLERS

LITEON

High Density Mounting Type Photocoupler

LTV817/LTV827/LTV847
LTV817S/LTV827S/LTV847S
LTV817M/LTV827M/LTV847M

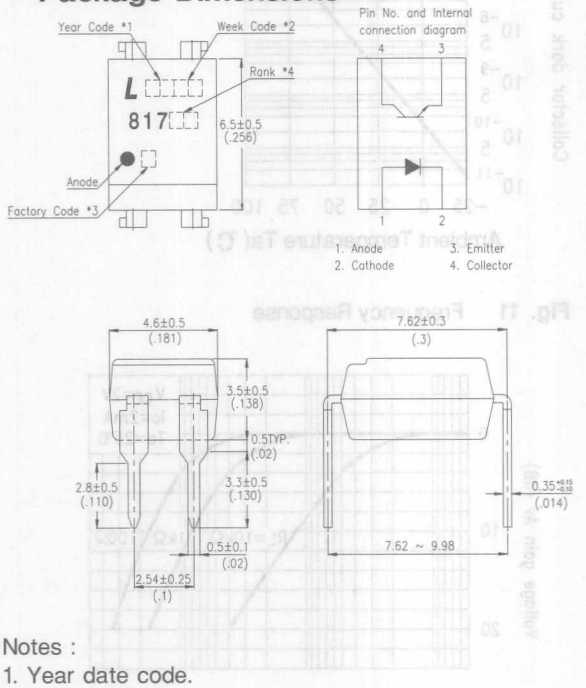
Features

1. Current transfer ratio
   (CTR : MIN. 50% at I_F = 1mA, V_{CE} = 5V)
2. High input-output isolation voltage :
   (Viso : 5,000Vrms)
3. Compact dual-in-line package
   LTV817 : 1-channel type
   LTV827 : 2-channel type
   LTV847 : 4-channel type
4. UL approved (No. E113898)
5. TUV approved (No. R9653630)
6. CSA approved (No. LR91533)
7. FIMKO approved (No. 193422)
8. NEMKO approved (No. P96103013)
9. DEMKO approved (No. 303986)
10. SEMKO approved (No. 9646047/01-30)
11. VDE approved (No. 94722 Thailand)
12. Options Available :
    - Leads with 0.4" (10.16mm) Spacing (M Type)
    - Lead Bends for Surface Mounting (S Type)
    - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
    - Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
    - VDE 0884 Approvals (Add "-V" Suffix)

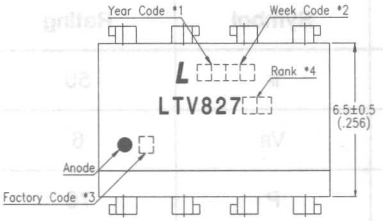
Applications

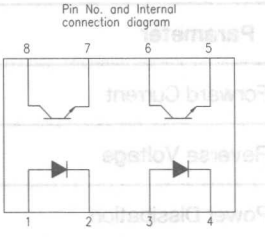
1. Computer terminals.
2. System appliances, measuring instruments.
3. Resgisters, copiers, automatic vending machines.
4. Electric home appliances such as fan heaters, etc.
5. Medical instruments, physical and chemical equipments.
6. Signal transmission between circuits of different potentials and impedances.

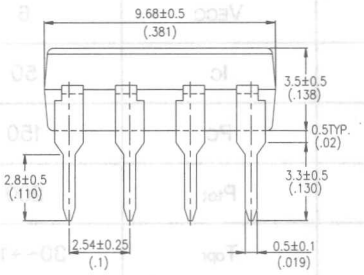
Package Dimensions

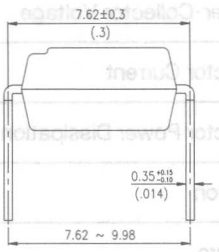


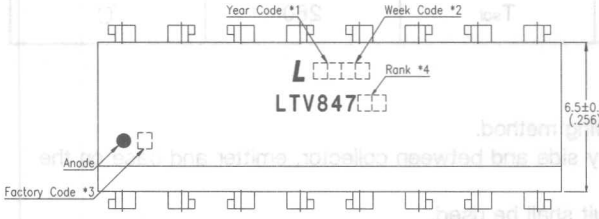
Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. Rank shall be or shall not be marked.
5. All dimensions are in millimeters (inches).
6. Tolerance is ± 0.25mm (.010") unless otherwise noted.
7. Specifications are subject to change without notice.

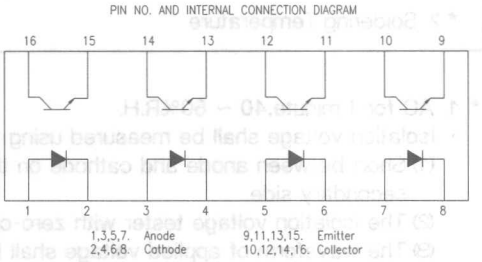

Year Code *1
Week Code *2
Rank *4
LTV827
6.5±0.5
(.256)
Anode
Factory Code *3

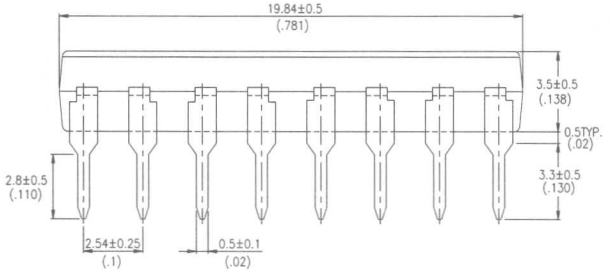

Pin No. and Internal
connection diagram
8 7 6 5
1 2 3 4
1,3. Anode
2,4. Cathode
5,7. Emitter
6,8. Collector

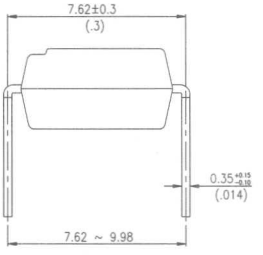

9.68±0.5
(.381)
3.5±0.5
(.138)
0.5TYP.
(.02)
2.8±0.5
(.110)
3.3±0.5
(.130)
2.54±0.25
(.1)
0.5±0.1
(.019)


7.62±0.3
(.3)
0.35 +0.15 −0.10
(.014)
7.62 ~ 9.98


Year Code *1
Week Code *2
Rank *4
LTV847
6.5±0.5
(.256)
Anode
Factory Code *3


PIN NO. AND INTERNAL CONNECTION DIAGRAM
16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
1,3,5,7. Anode
2,4,6,8. Cathode
9,11,13,15. Emitter
10,12,14,16. Collector


19.84±0.5
(.781)
3.5±0.5
(.138)
0.5TYP.
(.02)
2.8±0.5
(.110)
3.3±0.5
(.130)
2.54±0.25
(.1)
0.5±0.1
(.02)


7.62±0.3
(.3)
0.35 +0.15 −0.10
(.014)
7.62 ~ 9.98

Absolute Maximum Ratings

(Ta=25 ℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector-Emitter Voltage	V_{CEO}	35	V
	Emitter-Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	200	mW
Operating Temperature		T_{opr}	-30~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
* 1. Isolation Voltage		V_{iso}	5	KV_{rms}
* 2. Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.
* 2. For 10 seconds.

Electrical/Optical Characteristics

(Ta=25 ℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breadown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	* Current Transfer Ratio	CTR	50	—	600	%	I_F=5mA, V_{CE}=5V R_{BE}=∞
	Collector Current	I_C	2.5	—	30	mA	I_F=5mA, V_{CE}=5V
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	I_F=20mA, I_C=1mA
	Isolation Resistance	R_{ISO}	5×10^{10}	10^{11}	—	Ω	DC500V, 40~60% R.H.
	Floating Capacitance	C_f	—	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f_c	—	80	—	KHz	V_{CE}=5V, I_C=2mA R_L=100Ω, -3dB
	Response Time (Rise)	t_r	—	4	18	μs	V_{CE}=2V, I_C=2mA R_L=100Ω
	Response Time (Fall)	t_f	—	3	18	μs	

* $CTR = \frac{I_C}{I_F} \times 100\%$

■ Supplement

Rank Table Of Current Transfer Ratio CTR

Model No.	Rank Mark	CTR(%)
LTV817 L	L	50~100
LTV817 A	A	80~160
LTV817 B	B	130~260
LTV817 C	C	200~400
LTV817 D	D	300~600
LTV817	L or A or B or C or D	50~600

Conditions	I_F=10mA V_{CE}=5V Ta=25 ℃

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current vs. Ambient Temperature

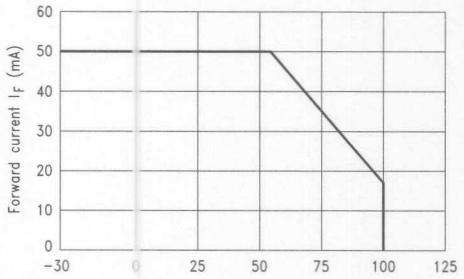


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

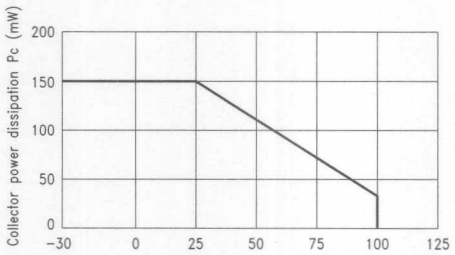


Fig. 3 Collector-emitter Saturation Voltage Vs. Forward Current

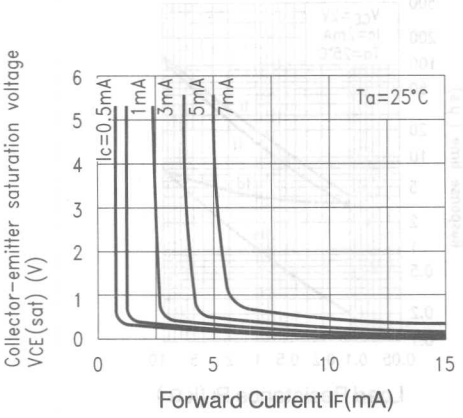


Fig. 4 Current Transfer Ration Vs. Forward Current

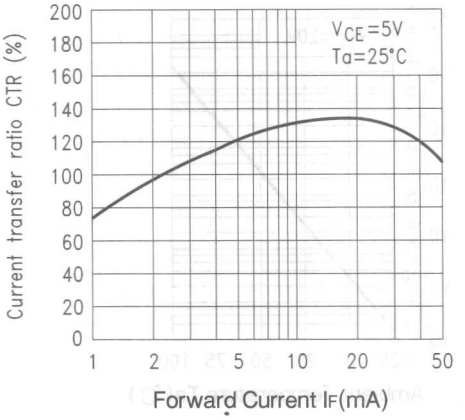


Fig. 5 Forward Current Vs. Forward Voltage

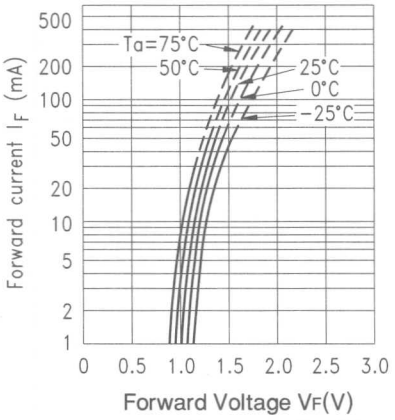


Fig. 6 Collector Current Vs. Collector-emitter Voltage

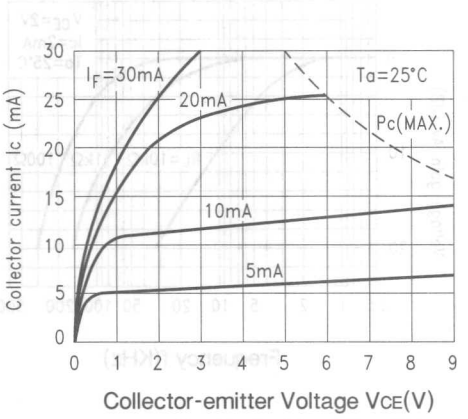


Fig. 5 Relative Current Transfer Ratio Vs. Ambient Temperature

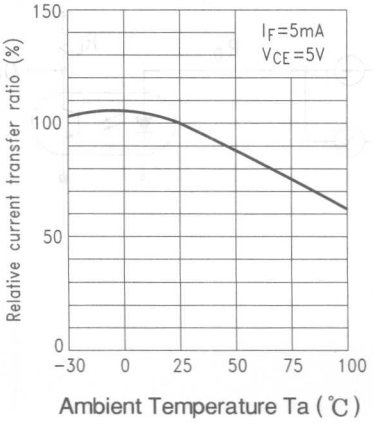
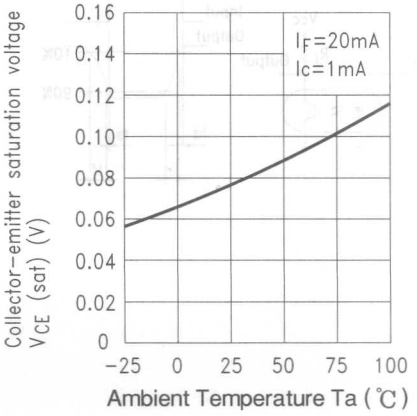


Fig. 6 Collector-emitter Saturation Voltage Vs. Ambient Temperature



PHOTOCOUPLERS

Fig. 9 Collector Dark Current Vs. Ambient Temperature

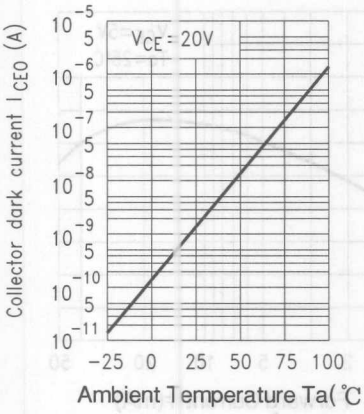


Fig. 10 Response Time Vs. Load Resistance

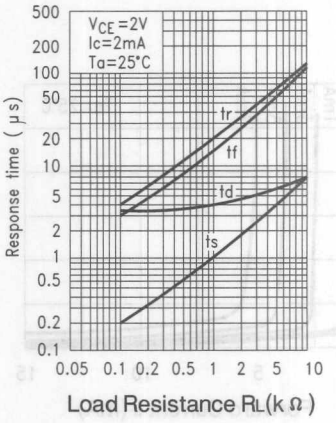
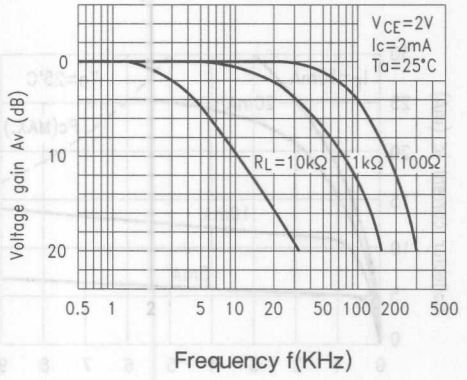
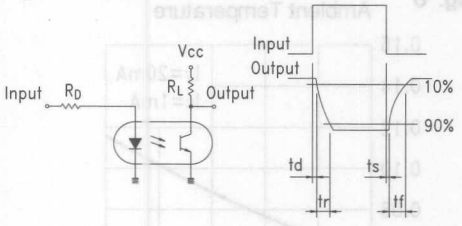


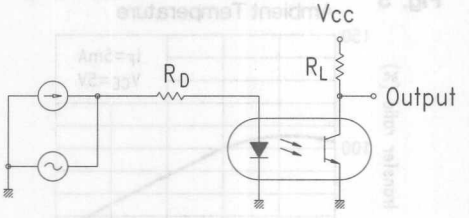
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



LITEON

High Density Mounting Type Photocoupler

LTV819-1/ LTV819-2/LTV829/LTV849
LTV819-1M/ LTV819-2M/LTV829M/LTV849M
LTV819-1S/ LTV819-2S/LTV829S/LTV849S

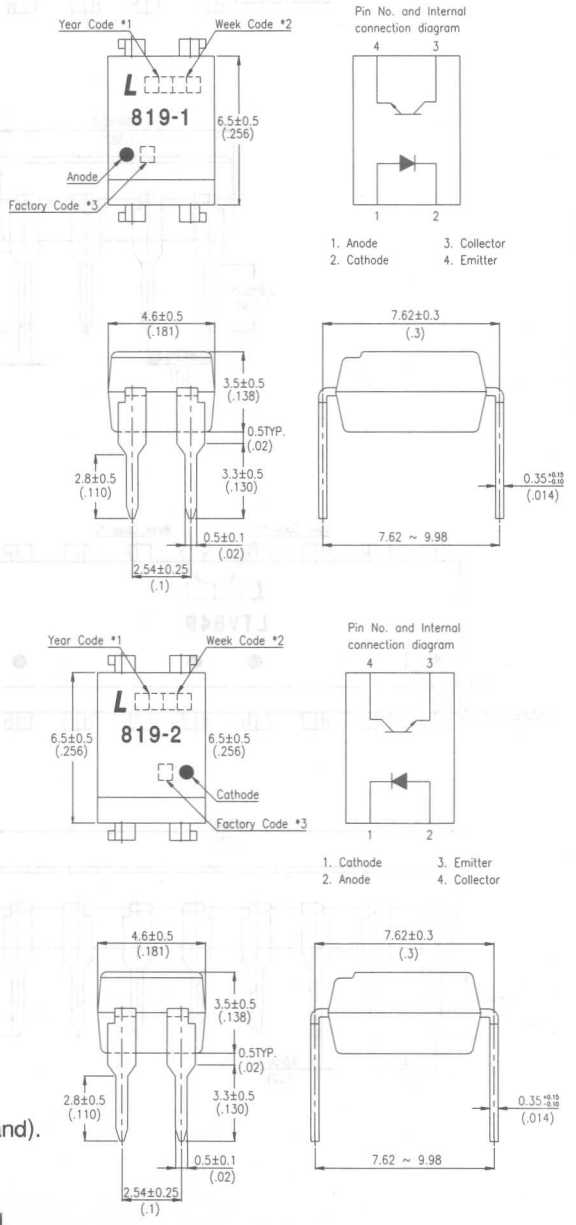
Features

- Current transfer ratio
  (CTR : MIN. 50% at I_F = 5mA, V_{CE} = 5V)
- High input-output isolation voltage :
  (Viso : 5,000Vrms)
- Compact dual-in-line package
  LTV819-1 : 1-channel type
  LTV819-2 : 1-channel type
  LTV829 : 2-channel type
  LTV849 : 4-channel type
- UL approved (No. E113898)
- TUV approved (No. R9653630)
- CSA approved (No. LR91533)
- FIMKO approved (No. 193422)
- NEMKO approved (No. P96103013)
- DEMKO approved (No. 303986)
- SEMKO approved (No. 9646047/01-30)
- VDE approved (No. 94722 Thailand)
- Options Available :
  - Leads with 0.4" (10.16mm) Spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD(Add"-TA"Suffix)
  - Tape and Reel of Type II for SMD(Add"-TA1"Suffix)
  - VDE 0884 Approvals (Add "-V" Suffix)

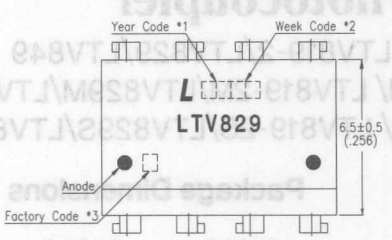
Applications

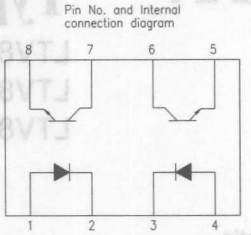
1. Telephone exchanges.
2. Computer terminal.
3. System appliances, measuring instruments.
4. Signal transmission between circuits of different potentials and impedances.

Package Dimensions

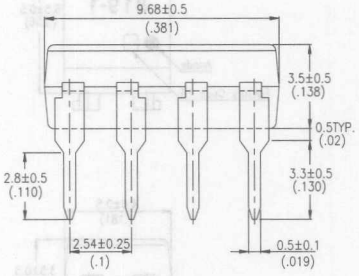


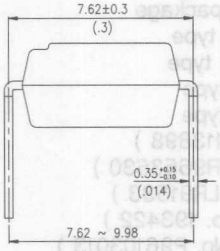
Notes :
1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. Rank shall be or shall not be marked.
5. All dimensions are in millimeters (inches).
6. Tolerance is ± 0.25mm (.010") unless otherwise noted.
7. Specifications are subject to change without notice.

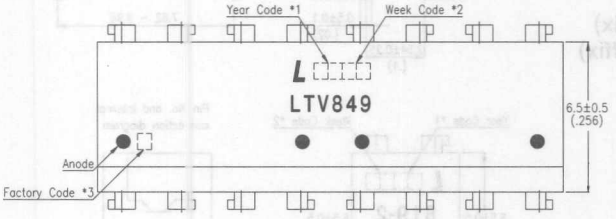


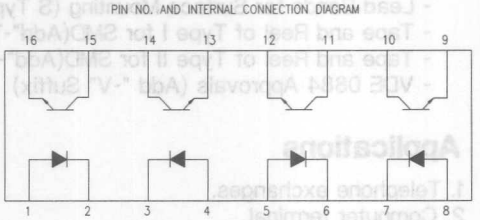


1,4. Anode
2,3. Cathode
5,8. Emitter
6,7. Collector

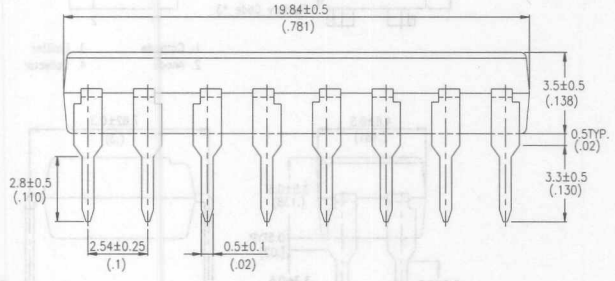


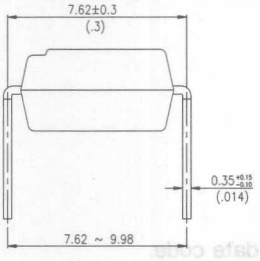






1,4,5,8. Anode
2,3,6,7. Cathode
9,12,13,16. Emitter
10,11,14,15. Collector





Absolute Maximum Ratings (Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
Output	Collector - Emitter Voltage	V_{CEO}	35	V
	Emitter - Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
Total Power Dissipation		P_{tot}	170	mW
*1 Isolation Voltage		V_{iso}	5,000	V_{rms}
Operating Temperature		T_{opr}	-25 ~ +100	℃
Storage Temperature		T_{stg}	-40 ~ +125	℃
*2 Soldering Temperature		T_{sol}	260	℃

* 1. AC for 1 minute,40 ~ 60%R.H.
  - Isolation voltage shall be measured using the following method.
    (1) Short between anode and cathode on the primary side and between collector, emitter and base on the secondary side.
    (2) The isolation voltage tester with zero-cross circuit shall be used.
    (3) The waveform of applied voltage shall be a sine wave.

* 2. For 10 seconds.

Electrical/Optical Characteristics (Ta=25℃)

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input	Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	—	—	10	μA	V_R=4V
	Terminal Capacitance	C_t	—	30	250	pF	V=0, f=kHz
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V
	Collector-Emitter Breakdown Voltage	BV_{CEO}	35	—	—	V	I_C=0.1mA
	Emitter-Collector Breakdown Voltage	BV_{ECO}	6	—	—	V	I_E=10μA
Transfer Characteristics	Collector Current	I_C	2.5	—	20	mA	I_F=5mA V_{CE}=5V
	*1 Current Transfer Ratio	CTR	50	—	400	%	
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	I_F=20mA I_C=1mA
	Isolation Resistance	R_{iso}	5×10^{10}	10^{11}	—	Ω	DC500V, 40 ~ 60%R.H.
	Floating Capacitance	C_f	—	0.6	1	pF	V=0, f=1MHz
	Cut-Off Frequency	f_c	—	80	—	kHz	V_{CE}=5V, I_C=2mA R_L=100Ω,-3dB
	Response Time (Rise)	t_r	—	4	—	μS	V_{CE}=2V, I_C=2mA R_L=100Ω
	Response Time (Fall)	t_f	—	3	—	μS	

* CTR = $\frac{I_C}{I_F}$ x 100%

Typical Electrical / Optical Characteristic Curves (25℃ Ambient Temperature Unless Otherwise Noted)

Fig. 1 Forward Current Vs. Ambient Temperature

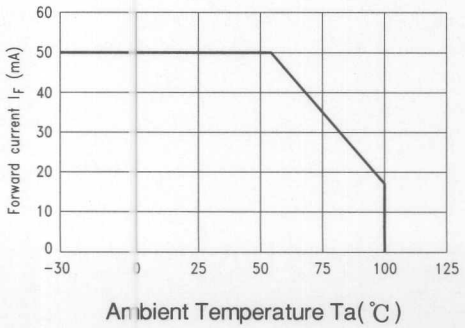


Fig. 2 Collector Power Dissipation Vs. Ambient Temperature

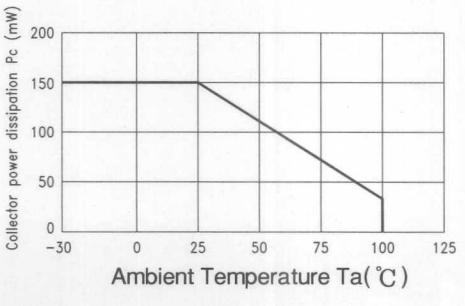


Fig. 3 Collector-Emitter Saturation Voltage Vs. Forward Current

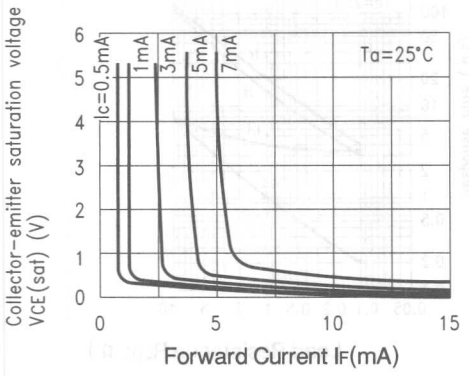


Fig. 4 Forward Current Vs. Forward Voltage

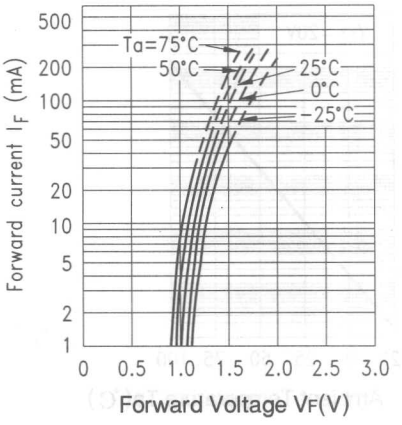


Fig. 5 Current Transfer Ratio Vs. Forward Current

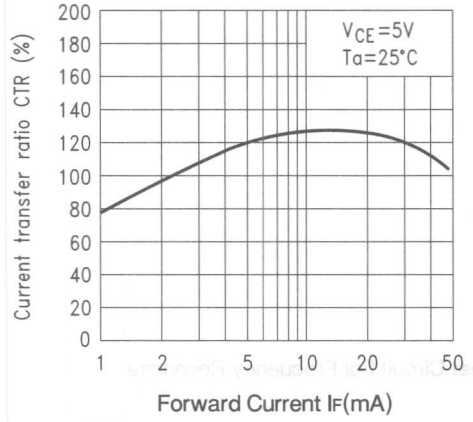


Fig. 6 Collector Current Vs. Collector-emitter Voltage

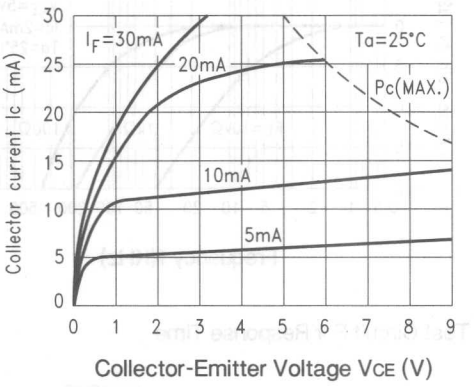


Fig. 7 Relative Current Transfer Ratio Vs. Ambient Temperature

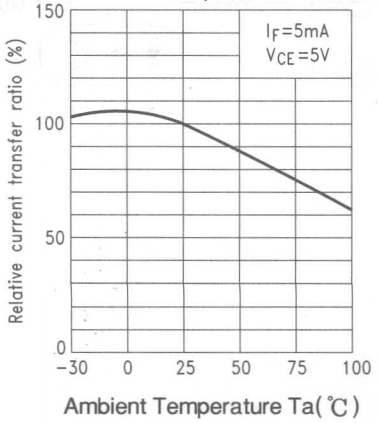


Fig. 8 Collector-Emitter Saturation Voltage Vs. Ambient Temperature

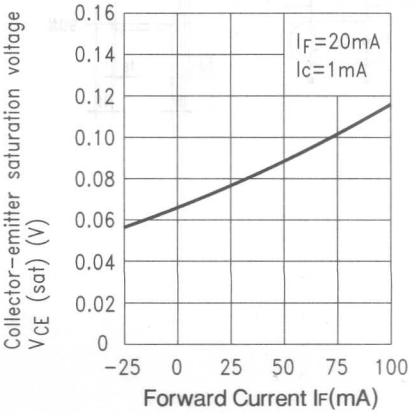


Fig. 9 Collector Dark current Vs. ambient Temperature

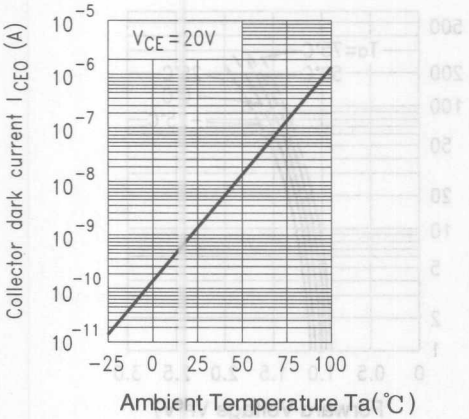


Fig. 10 Response Time Vs. Load Resistance

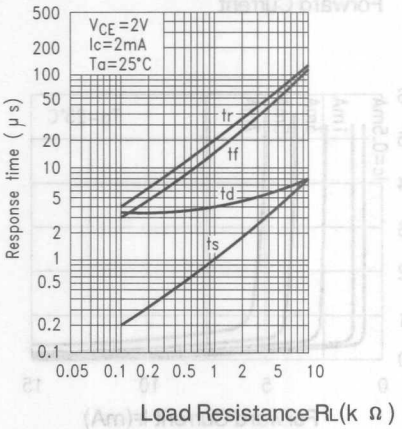
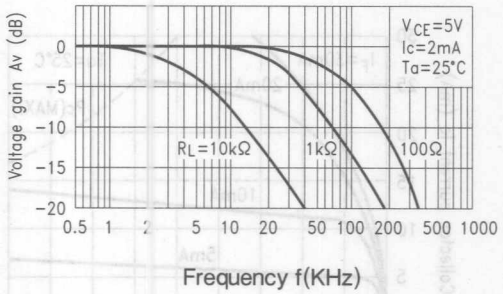
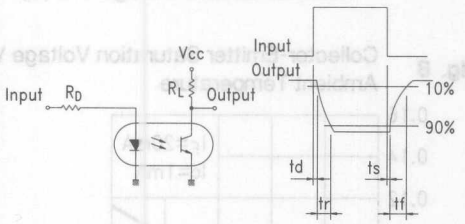


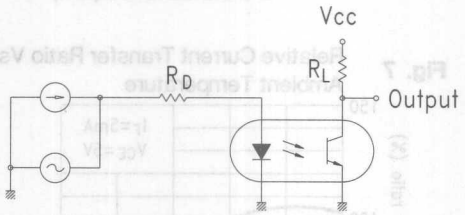
Fig. 11 Frequency Response



Test Circuit For Response Time



Test Circuit For Frequency Response



Photocoupler Options

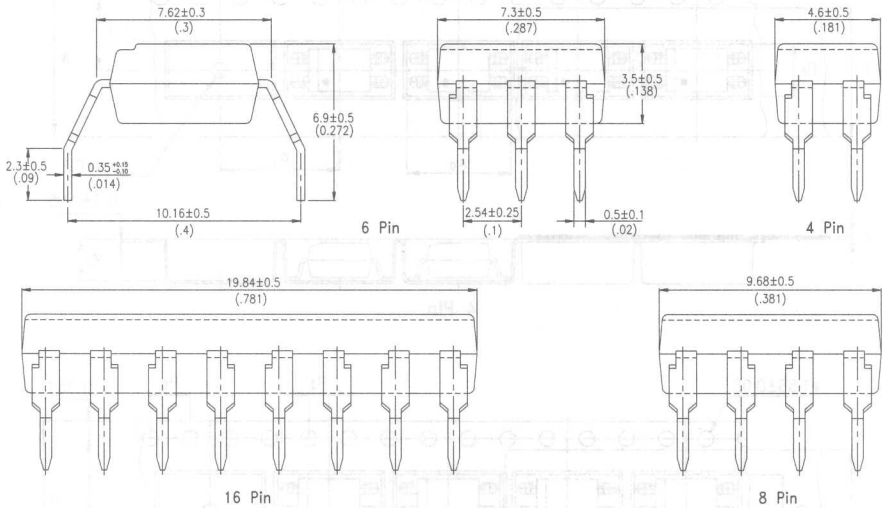
■ Option 1 Leads with 0.4" (10.16 mm) Spacing (M Type)

The leads of the photocouplers are bent according to a spacing of 0.4" (10.16 mm). Dimensions deviating from the standard type are :

Lead spacing 10.16 mm (0.4")
Creepage distance > 8.0 mm
Clearance > 8.0 mm

This version additionally complies with the following standards :

- IEC 950 DIN VDE 0805/5 90 (System 2 and 3 only) Reinforced insulation up to an operating voltage of 400 V_{rms} or DC.



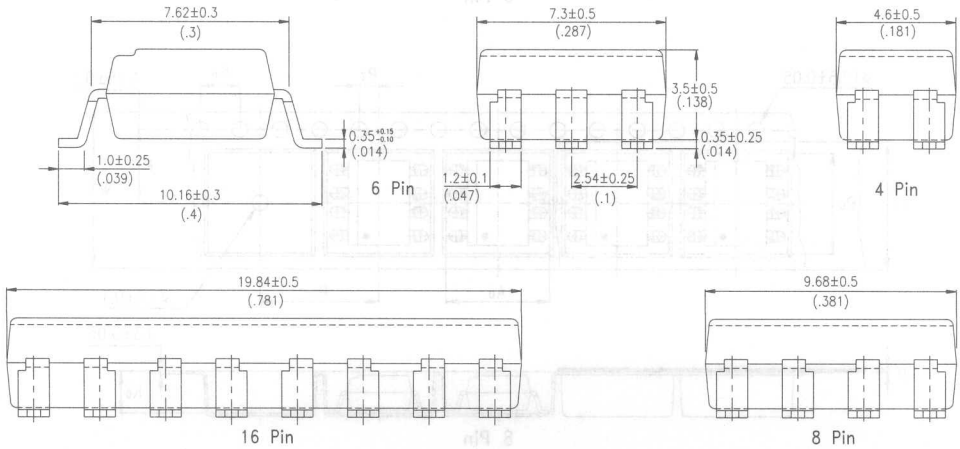
■ Option 2 Lead Bends for Surface mount (SMD) Photocouplers (S Type)

These photocouplers are suitable for surface mounting. Dimensions deviating from the standard type are :

Creepage distance > 8.0 mm
Clearance > 8.0 mm

This version additionally complies with the following standards :

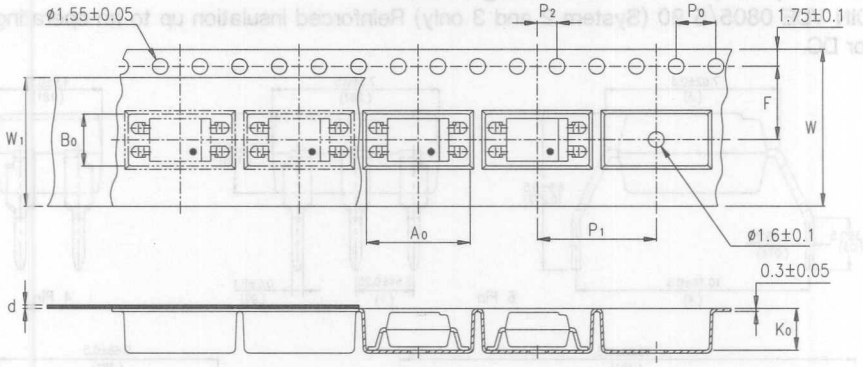
- IEC 950 DIN VDE 0805/5 90 (System 2 and 3 only) Reinforced insulation up to an operating voltage of 400 Vrms or DC.



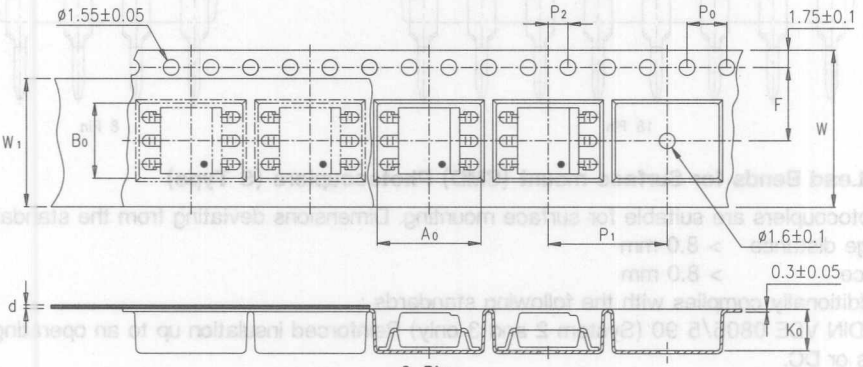
Tape & Reel Specification

■ Tape and Reel Packaging of Type I for 4-Pin, 6-Pin, and 8-Pin Photocouplers

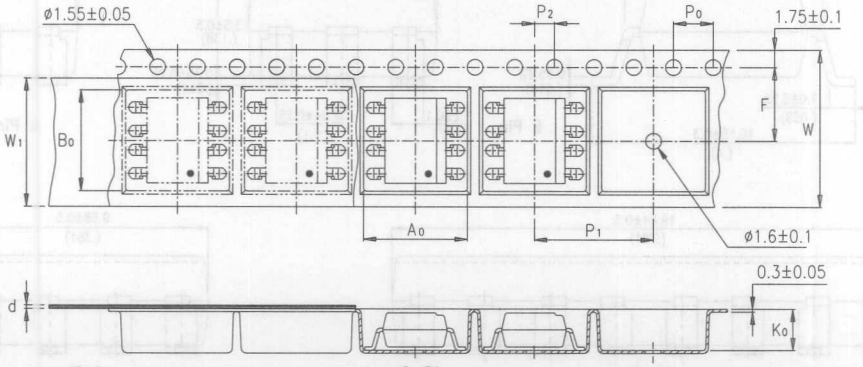
- All 4-pin, 6-pin, and 8-pin photocouplers of S type (SMD) are available in this tape and reel format.
- To order any LTVxxxxS photocoupler in tape and reel of type I, add a suffix "-TA" after the part number, i.e., LTV817S-TA, LTV4N35S-TA, or LTV824S-TA.
- The tape is 16mm and is wound on a 33cm reel.
- There are 1,000 parts per reel.



4 Pin



6 Pin

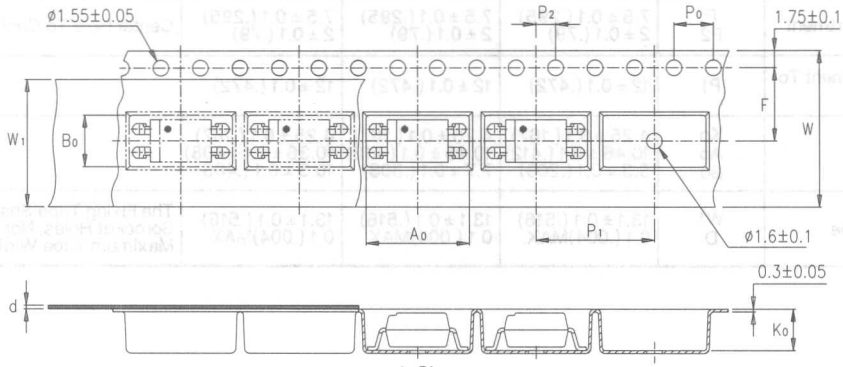


8 Pin

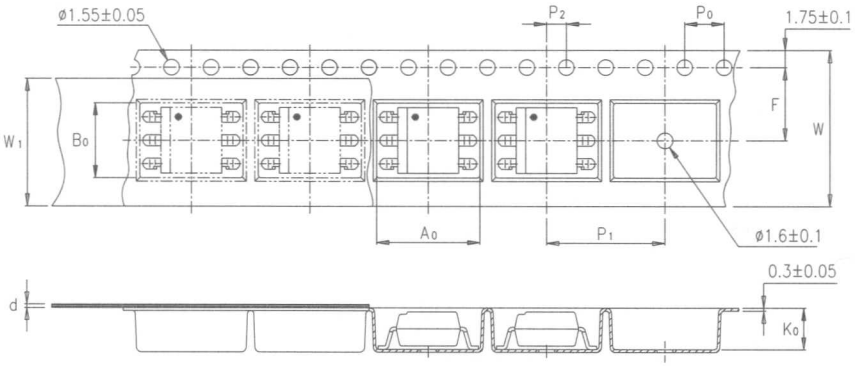
Tape & Reel Specification

■ Tape and Reel Packaging of Type II for 4-Pin, 6-Pin, and 8-Pin Photocouplers

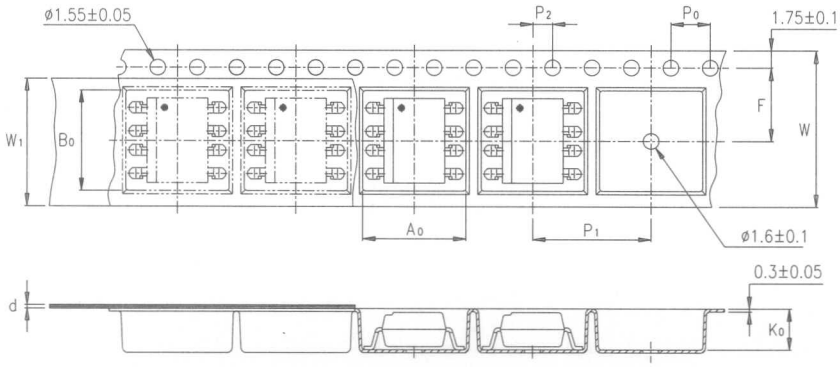
- All 4-pin, 6-pin, and 8-pin photocouplers of S type (SMD) are available in this tape and reel format.
- To order any LTVxxxxS photocoupler in tape and reel of type II, add a suffix "-TA1" after the part number, i.e., LTV817S-TA1, LTV4N35S-TA1, or LTV824S-TA1.
- The tape is 16mm and is wound on a 33cm reel.
- There are 1,000 parts per reel. Taped and reeled photocouplers of this type conform to EIA-481.



4 Pin



6 Pin



8 Pin

Tape & Reel Specification

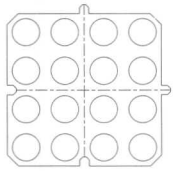
Description	Symbol	Dimensions In mm (Inches)			Notes
		4-Pin	6-Pin	8-Pin	
Tape Width	W	16 ± 0.3 (.63)	16 ± 0.3 (.63)	16 ± 0.3 (.63)	
Pitch Of Sprocket Holes	Po	4 ± 0.1 (.15)	4 ± 0.1 (.15)	4 ± 0.1 (.15)	Cummulative Pitch Error + 0.2Mm/10 Pitches
Distance Of Compartment	F P2	7.5 ± 0.1 (.295) 2 ± 0.1 (.79)	7.5 ± 0.1 (.295) 2 ± 0.1 (.79)	7.5 ± 0.1 (.295) 2 ± 0.1 (.79)	Center Hole To Center compartment
Distance Compatrtment To Compartment	P1	12 ± 0.1 (.472)	12 ± 0.1 (.472)	12 ± 0.1 (.472)	
Compartment	Ko Ao Bo	4.25 ± 0.1 (.167) 10.46 ± 0.1 (.412) 5.3 ± 0.1 (.209)	4.25 ± 0.1 (.167) 10.46 ± 0.1 (.412) 7.7 ± 0.1 (.303)	4.25 ± 0.1 (.167) 10.36 ± 0.1 (.408) 10.3 ± 0.1 (.406)	
Width Of Fixing Tape	W1 D	13.1 ± 0.1 (.516) 0.1 (.004)MAX.	13.1 ± 0.1 (.516) 0.1 (.004)MAX.	13.1 ± 0.1 (.516) 0.1 (.004)MAX.	The Fixing Tape Shall Not Cover The Sprocket Holes, Nor Protrude Beyond Maximum Tape Width

5.RGB PRODUCTS

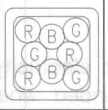
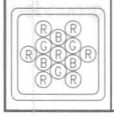
- SELECTION GUIDE 5-1
- 4 × 4 FULL-COLOR DOT MATRIX LED DISPLAYS··· 5-2
- □22 mm FULL-COLOR CLUSTER LAMP 5-6
- □30 mm FULL-COLOR CLUSTER LAMP 5-9

Selection Guide

· 4 × 4 Full Color Dot Matrix LED Displays

Package	Part No.	Color(λ P)	Description	Typ. Iv/Dot @IP=80mA 1/16 Duty	Page No.
 47.1mm(9 ϕ) Dual-In-Line 2.0"H × 2.0"W × .34"D	LTP-2C44F-01	Ultra Bright Red (660nm) Green (565nm) Blue (430nm)	Anode Row Cathode Column	9600 μ cd 12000 μ cd 4500 μ cd	5-2

· LED Cluster Lamps

Outline	Device		Description		Luminous Intensity Iv Typ.	Viewing Angle 2 θ 1/2 Typ.	Supply Current	Page No.
	Package	Part No.	Color(λ P)	LED Number				
	□ 22	LTM-9705	Red(660nm) Green(520nm) Blue(468nm)	3 3 2	0.9cd 3.3cd 0.74cd	45 °	20mA	5-6
	□ 30	LTM-9707	Red(660nm) Green(520nm) Blue(468nm)	7 3 3	1.8cd 3.3cd 1.1cd	45 °	20mA	5-9

RGB PRODUCTS

9ϕ 4 × 4 Full Color Dot Matrix LED Display

LTP-2C44F-01

Features

- 1.854 inch (47.10mm) matrix height ; 0.5 inch (12.70mm) pitch.
- Continuous uniform dots.
- Low power requirement.
- Excellent characters and appearance.
- 4×4 array with X-Y select.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- Epoxy type.

Description

The LTP-2C44F-01 is a 1.854 inch (47.10mm) matrix height dot matrix display. This display utilizes ultra bright red, green, blue LED chips. The ultra bright red LED chips are made from GaAlAs on a GaAs subatrate. The green LED chips are made from GaP on a GaP substrate. The blue LED chips are made from GaN on a SiC substrate. And this display has gray face and white dots.

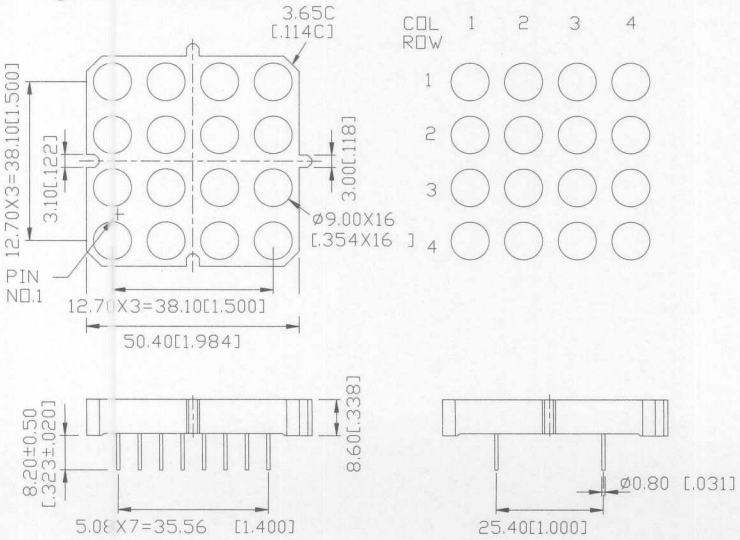
Device

Part No.	Description
LTP-2C44F-01	Anode Row Cathode Column
Full Color	

★ Caution

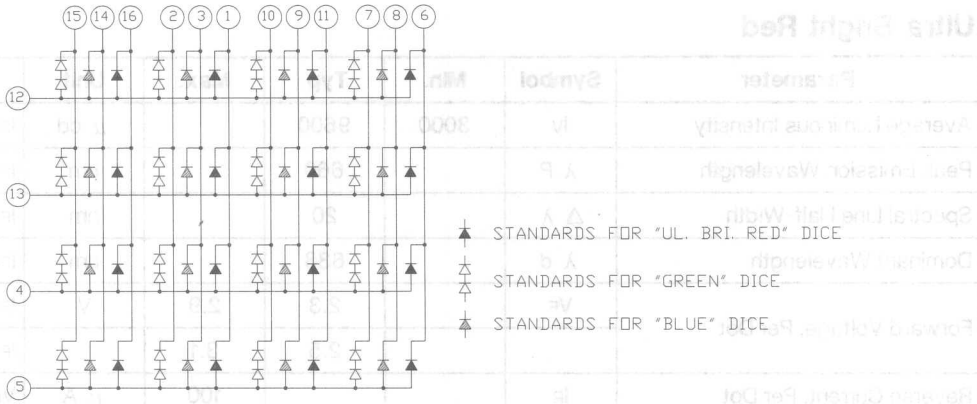
The LEDs will be damaged by the static electricity. Anti-electrostatic equipment is recommended when holding the LED. The application must be grounded.

Package Dimensions



Note:1. All dimensions are in millimeters[inches].
2. Tolerance: ±0.25mm[0.01"] unless otherwise noted.

Internal Circuit Diagram



Pin Connection

No	Connection	No	Connection
1	Cathode Column 2 Ul. Bri. Red	9	Cathode Column 3 Blue
2	Cathode Column 2 Green	10	Cathode Column 3 Green
3	Cathode Column 2 Blue	11	Cathode Column 3 Ul. Bri. Red
4	Anode Row 3	12	Anode Row 1
5	Anode Row 4	13	Anode Row 2
6	Cathode Column 4 Ul. Bri. Red	14	Cathode Column 1 Blue
7	Cathode Column 4 Green	15	Cathode Column 1 Green
8	Cathode Column 4 Blue	16	Cathode Column 1 Ul. Bri. Red

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Ul. Bri. Red	Green	Blue	Unit
Average Power Dissipation Per Dot	36	64	50	mW
Peak Forward Current Per Dot	100	90	100	mA
Average Continuous Forward Current Per Dot	14	11	14	mA
Derating Linear from 25 ℃ Per Dot	0.19	0.15	0.19	mA/ ℃
Reverse Voltage Per Dot	5	10	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical / Optical Characteristics at Ta=25 ℃

Ultra Bright Red

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	3000	9600		μ cd	IP=80mA 1/16 Duty
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		20		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Dot	VF		2.3	2.9	V	IF=20mA
			2.5	3.1		IF=80mA
Reverse Current, Per Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	3900	12000		μ cd	IP=80mA 1/16 Duty
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Dot	VF		4.2	5.6	V	IF=20mA
			6.0	7.4		IF=80mA
Reverse Current, Per Dot	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Blue

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1370	4500		μ cd	IP=80mA 1/16 Duty
Peak Emission Wavelength	λ P		430		nm	IF=20mA
Spectral Line Half-Width	Δ λ		65		nm	IF=20mA
Dominant Wavelength	λ d		468		nm	IF=20mA
Forward Voltage, Per Dot	VF		4.9	5.5	V	IF=20mA
			6.7	7.3		IF=80mA
Reverse Current, Per Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Note:
Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (commission international DEL 'clariage) eye-response curve.

Typigsal Electrical / Optical Characteristics Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

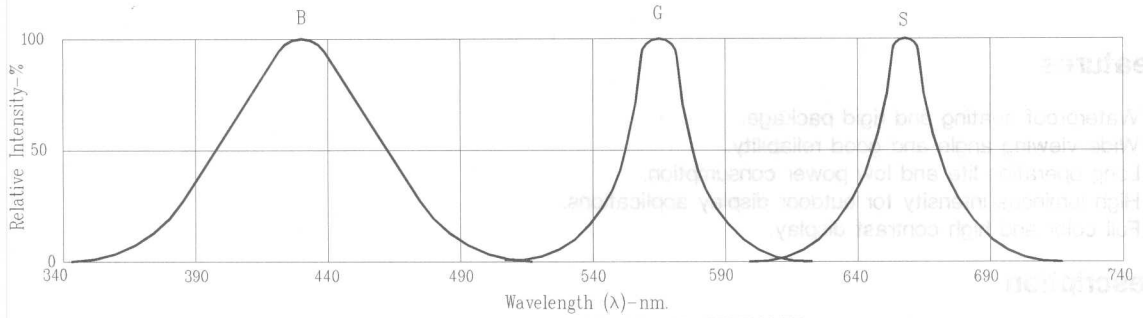


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

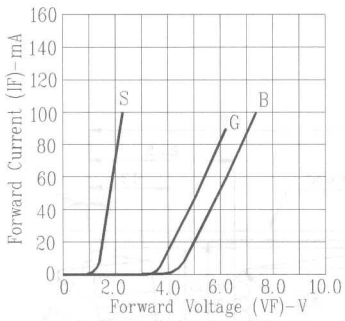


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

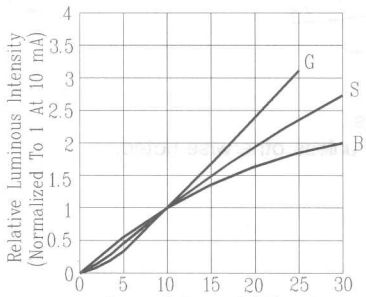


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

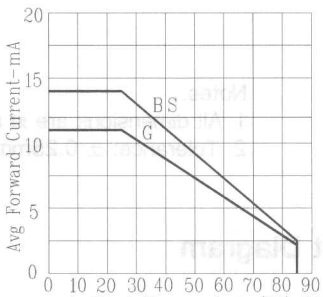


Fig4. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

NOTE: S=UL BRI.RED. G=GREEN B=BLUE

RGB PRODUCTS

LITEON

□ 22mm Full-Color Cluster Lamp

LTM-9705

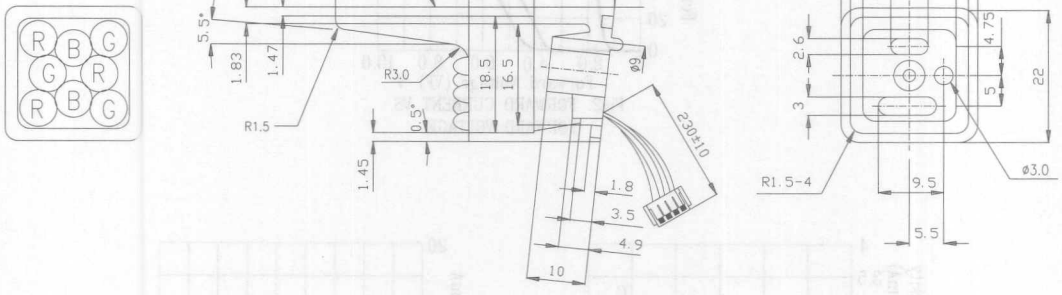
Features

- Waterproof seating and rigid package.
- Wide viewing angle and good reliability.
- Long operation life and low power consumption.
- High luminous intensity for outdoor display applications.
- Full color and high contrast display.

Description

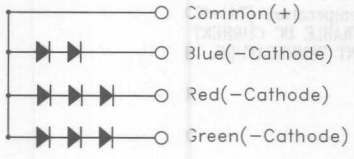
- □ 22mm full-color (red,green and blue) LED lamp cluster.
- Number of built-in LED lamps: 3 pcs of ultra-bright red LED & 3 pcs of green LED & 2 pcs of blue LED.

Package Dimensions



Notes:
1. All dimensions are in millimeters.
2. Tolerance: ± 0.25mm (0.010") unless otherwise noted.

Internal Circuit Diagram



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Green	Blue	Unit
Power Dissipation	220	360	240	mW
Continuous Forward Current	30	30	30	mA
Reverse Voltage	12	15	15	V
Operating Temperature Range	-25.....+60 ℃			
Storage Temperature Range	-30.....+80 ℃			

Electrical Characteristics at Ta=25 ℃

Item	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Forward Voltage	V_F	Red Green Blue		5.4 10.5 7		V	I_F=20 mA
Reverse Current	I_R	Red Green Blue			100 10 10	μ A	V_R=12V V_R=15V V_R=10V

Optical Characteristics at Ta=25 ℃

Item	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Peak Wavelength	λ P	Red Green Blue		660 520 468		nm	I_F =20mA
Luminous Intensity	Iv	Red Green Blue		0.9 3.3 0.74		cd	I_F =20mA
Viewing Angle	2 θ 1/2	Red Green Blue		45		deg	

Typical Electrical / Optical Curves at Ta=25 ℃

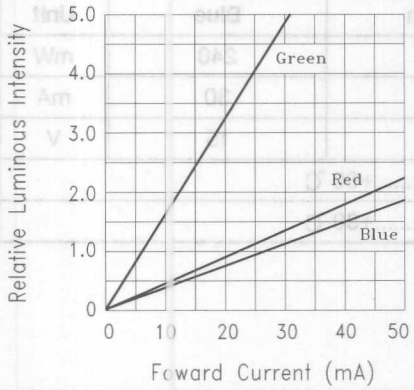


FIG.1 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

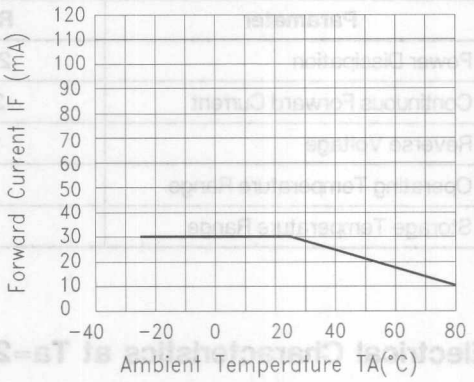


FIG.3 FORWARD CURRENT DERATING CURVE

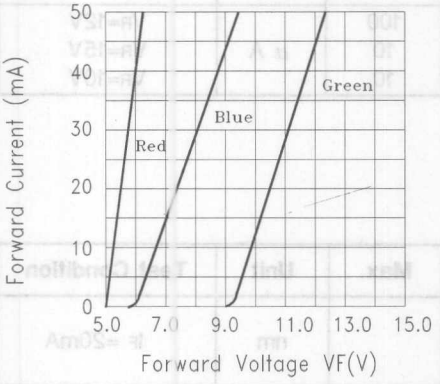


FIG.2 FORWARD CURRENT VS. FORWARD VOLTAGE

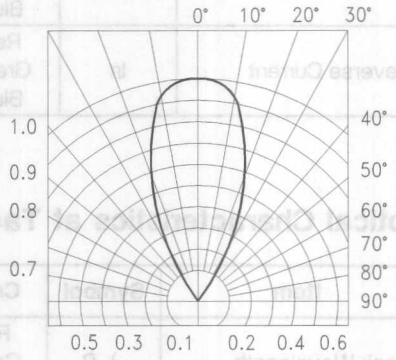


FIG.4 SPATIAL DISTRIBUTION

LITEON

□ 30mm Full-Color Cluster Lamp

LTM-9707

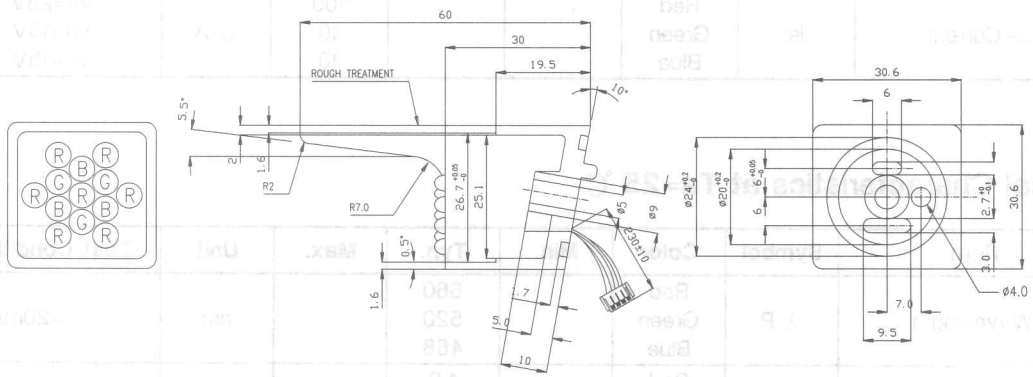
Features

- Waterproof seating and rigid package.
- Wide viewing angle and good reliability.
- Long operation life and low power consumption.
- High luminous intensity for outdoor display applications.
- Full color and high contrast display.

Description

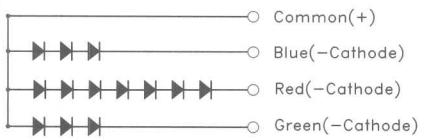
- □ 30mm full-color (red,green and blue) LED lamp cluster.
- Number of built-in LED lamps: 7 pcs of ultra-bright red LED & 3 pcs of green LED & 3 pcs of blue LED.

Package Dimensions



Notes:
1. All dimensions are in millimeters.
2. Tolerance: ± 0.25mm (.010") unless otherwise noted.

Internal Circuit Diagram



RGB PRODUCTS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Green	Blue	Unit
Power Dissipation	520	360	360	mW
Continuous Forward Current	30	30	30	mA
Reverse Voltage	28	15	15	V
Operating Temperature Range	-25.....+60 ℃			
Storage Temperature Range	-30.....+80 ℃			

Electrical Characteristics at Ta=25 ℃

Item	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Forward Voltage	V_F	Red Green Blue		12.6 10.5 10.5		V	I_F=20 mA
Reverse Current	I_R	Red Green Blue			100 10 10	μ A	V_R=28V V_R=15V V_R=15V

Optical Characteristics at Ta=25 ℃

Item	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Peak Wavelength	λ P	Red Green Blue		660 520 468		nm	I_F =20mA
Luminous Intensity	Iv	Red Green Blue		1.8 3.3 1.1		cd	I_F =20mA
Viewing Angle	2 θ 1/2	Red Green Blue		45		deg	

Typical Electrical / Optical Curves at Ta=25 ℃

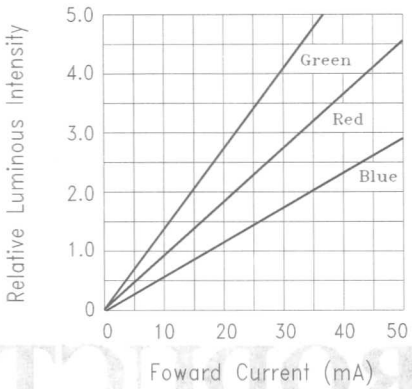


FIG.1 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

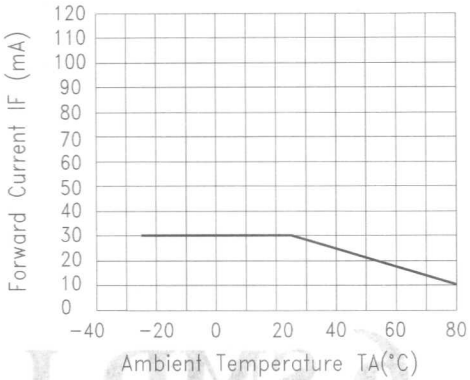


FIG.3 FORWARD CURRENT DERATING CURVE

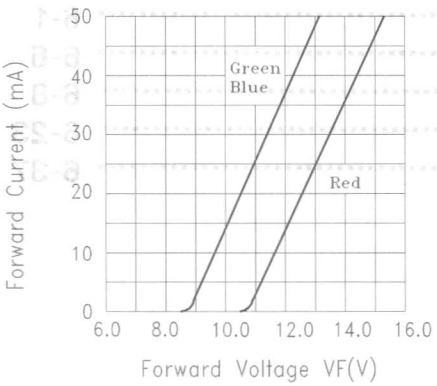


FIG.2 FORWARD CURRENT VS. FORWARD VOLTAGE

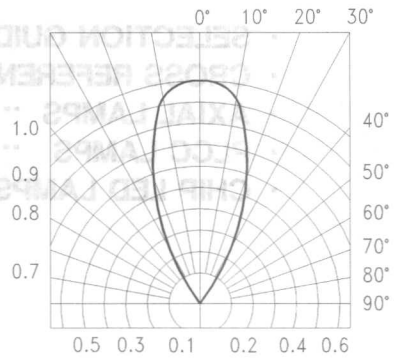


FIG.4 SPATIAL DISTRIBUTION

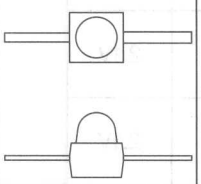
RGB PRODUCTS

6.SMD LED PRODUCTS

- SELECTION GUIDE ····· 6-1
- CROSS REFERENCE GUIDE ····· 6-6
- AXIAL LAMPS ····· 6-8
- PLCC LAMPS ····· 6-23
- CHIP LED LAMPS ····· 6-37

Selection Guide

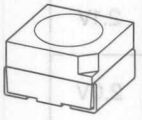
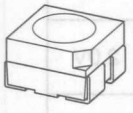
· Axial Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ ½ *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	Subminia-ture Lamp	LTL-93BCK1	GaAlAs Red (660 nm)	Water Clear	200.0 mcd @20mA	34 °	1.8V	6-8
		LTL-93BPK1	Bright Red (697 nm)	Water Clear	8.7 mcd	34 °	2.1V	
		LTL-93BEK1	Hi, Eff, Red (635 nm)	Water Clear	19 mcd	34 °	2.0V	
		LTL-93BGK1	Green (565 nm)	Water Clear	19 mcd	34 °	2.1V	
		LTL-93BYK1	Yellow (585 nm)	Water Clear	19 mcd	34 °	2.1V	
		LTL-93BCA1	GaAlAs Red (660 nm)	Diffused	60 mcd @20mA	90 °	1.8V	
		LTL-93BPA1	Bright Red (697 nm)	Diffused	1.7 mcd	90 °	2.1V	
		LTL-93BHRA1	Hi, Eff, Red (635 nm)	Diffused	3.7 mcd	90 °	2.0V	
		LTL-93BGA1	Green (565 nm)	Diffused	3.7 mcd	90 °	2.1V	
		LTL-93BYA1	Yellow (585 nm)	Diffused	3.1 mcd	90 °	2.1V	

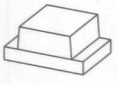
Notes:
*$2\theta\frac{1}{2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
**Peak Emission wavelength (nm).

Selection Guide

· PLCC LAMP

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	PLCC Surface Mount LED Lamp	LTL-94PURK	GaAlAs Red (660nm)	Water Clear	80.0 mcd	120 °	1.8V	6-23
		LTL-94PCK	GaAlAs Red (660 nm)	Water Clear	50.0 mcd	120 °	1.8V	
		LTL-94PEK	Orange (630 nm)	Water Clear	8.0 mcd @10mA	120 °	2.0V	
		LTL-94PGK	Green (565 nm)	Water Clear	8.0 mcd @10mA	120 °	2.1V	
		LTL-94PYK	Yellow (585 nm)	Water Clear	6.0 mcd @10mA	120 °	2.1V	
		LTL-94PAK	Amber (610 nm)	Water Clear	8.0 mcd @10mA	120 °	2.1V	
		LTL-94THK	Green	Water Clear	8.0 mcd	120 °	2.1V	6-30
			Orange		8.0 mcd		2.0V	
		LTL-94TDK	Green	Water Clear	8.0 mcd	120 °	2.1V	
			Yellow		6.0 mcd		2.1V	

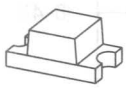
· Chip LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20 mA	Page No.
	Package	Part No.	Color (λ P)	Lens				
	Chip LED Lamp	LTST-C170CKT	GaAlAs Red (660nm)	Water Clear	20 mcd @20mA	130 °	1.8V	6-37
		LTST-C170AKT	Amber (610nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C170EKT	Orange (635nm)	Water Clear	6.0 mcd	130 °	2.0V	
		LTST-C170GKT	Green (565nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C170YKT	Yellow (585nm)	Water Clear	6.0 mcd	130 °	2.1V	

Notes:
*2θ1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
**Peak Emission wavelength (nm).

Selection Guide

· Chip LED Lamps

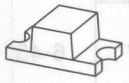
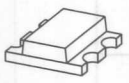
Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ ½ *	VF Typ. @20 mA	Page No.
	Package	Part No.	Color (λ P)	Lens				
	Chip LED Lamp	LTST-C150CKT	GaAlAs Red (660nm)	Water Clear	20 mcd @20mA	130 °	1.8V	6-43
		LTST-C150AKT	Amber (610nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C150EKT	Orange (635nm)	Water Clear	6.0 mcd	130 °	2.0V	
		LTST-C150GKT	Green (565nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C150YKT	Yellow (585nm)	Water Clear	6.0 mcd	130 °	2.1V	
	Chip LED Lamp	LTST-C190CKT	GaAlAs Red (660nm)	Water Clear	20 mcd @20mA	130 °	1.8V	6-43
		LTST-C190AKT	Amber (610nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C190EKT	Orange (635nm)	Water Clear	6.0 mcd	130 °	2.0V	
		LTST-C190GKT	Green (565nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C190YKT	Yellow (585nm)	Water Clear	6.0 mcd	130 °	2.1V	

Notes:
*2θ½ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
**Peak Emission wavelength (nm).

PRELIMINARY

Selection Guide

· Chip LED Lamps

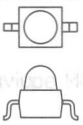
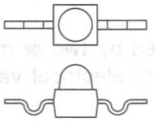
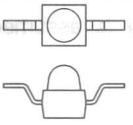
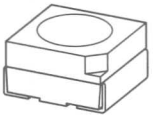
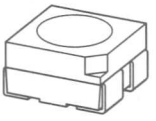
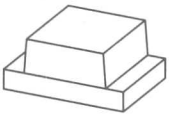
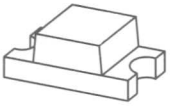
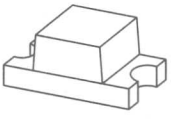
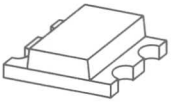
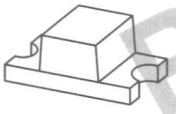
Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2 *	VF TyP. @20 mA	Page No.
	Package	Part No.	Color (λ P)	Lens				
	Chip LED Lamp	LTST-C230CKT	GaAlAs Red (660nm)	Water Clear	20 mcd @20mA	130 °	1.8V	6-53
		LTST-C230AKT	Amber (610nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C230EKT	Orange (635nm)	Water Clear	6.0 mcd	130 °	2.0V	
		LTST-C230GKT	Green (565nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C230YKT	Yellow (585nm)	Water Clear	6.0 mcd	130 °	2.1V	
	Chip LED Lamp	LTST-C155GYKT	Green (565nm)	Water Clear	6.0 mcd	130 °	2.1V	6-43
			Yellow (585nm)	Water Clear	6.0 mcd	130 °	2.1V	
		LTST-C155GEKT	Green (565nm)	Water Clear	6.0 mcd	130 °	2.1V	
			Orange (635nm)	Water Clear	6.0 mcd	130 °	2.0V	

Notes:
*2θ1/2 is the off axis angle at which the luminous intensity is half the axial luminous intensity.
**Peak Emission wavelength (nm).

PRELIMINARY

Selection Guide

· Surface Mount Tape and Reel

Outline	Option Code	Description	Page No.
	M-TA	Gull Wing,Tape and Reel,1500 Lamp per Reel	6-15
	P-TA	Yoke Lead,Tape and Reel ,1500 Lamp per Reel	
	Z-TA	Z-Bend,Tape and Reel ,1500 Lamp per Reel	
	LTL-94P-TA	Tape and Reel ,1500 Lamp per Reel	6-23
	LTL-94T-TA	Tape and Reel ,1500 Lamp per Reel	6-30
	LTST-C170XKT	Tape and Reel ,3000 Lamp per Reel	6-37
	LTST-C150XKT	Tape and Reel ,3000 Lamp per Reel	6-43
	LTST-C190XKT	Tape and Reel ,3000 Lamp per Reel	
	LTST-C155XKT	Tape and Reel ,3000 Lamp per Reel	
	LTST-C230XKT	Tape and Reel ,3000 Lamp per Reel	6-53

PRELIMINARY

Cross Reference Guide for:

H.P./TELEFUNKEN/SIEMENS/CITIZEN LED LAMPS

In order to designate the similarity between the other manufactures' device and the nearest LITON equivalent. This guide has been included a letter code system to cover this.

Since Optoelectronics is a relatively young industry, it is possible that different devices offered by two or more manufacturers will satisfy the requirements of one application. Therefore, slight mechanical of electrical variations should not disqualify the nearest equivalent.

The data contained in this guide is believed to be accurated. However, no responsibility is assumed by TAIWAN LITON ELECTRONIC CO., LTD. for the use of this data in actual circuit design.

Cross Reference Guide

SIEMENS Equivalent LED Lamps

SIEMENS Part No.	LITON Part No.
LS T670	LTL-94PEK-TA
LO T670	LTL-94PAK-TA
LY T670	LTL-94PYK-TA
LG T670	LTL-94PGK-TA

TELEFUNKEN Equivalent LED Lamps

TELEFUNKEN Part No.	LITON Part No.
TLMH 3100	LTL-94PEK-TA
TLMO 3100	LTL-94PAK-TA
TLMY 3100	LTL-94PYK-TA
TLMG 3100	LTL-94PGK-TA

H.P.(Hewlett Packard) Equivalent LED Lamps

H.P. Part No.	LITON Part No.
HLMP-6300	LTL-93BHRA1
HLMP-6400	LTL-93BYA1
HLMP-6500	LTL-93BGA1
HSMS-T400	LTL-94PEK-TA
HSMD-T400	LTL-94PAK-TA
HSMY-T400	LTL-94PYK-TA
HSMG-T400	LTL-94PGK-TA
HSMG-C670	LTL-C170GKT
HSMD-C670	LTL-C170EKT
HSMY-C670	LTL-C170YKT
HSMH-C670	LTL-C170CKT

CITIZEN Equivalent LED Lamps

CITIZEN Part No.	LITON Part No.
CL-170G	LTST-C170GKT
CL-170SD	LTST-C170EKT
CL-170Y	LTST-C170YKT
CL-170UR	LTST-C170CKT
CL-170D	LTST-C170AKT

Subminiature Solid State Lamps

LTL-93BCK1/CA1 GaAlAs Red LTL-93BGK1/GA1 Green
LTL-93BPK1/PA1 Bright Red LTL-93BYK1/YA1 Yellow
LTL-93BEK1/HRA1 Hi.Eff. Red

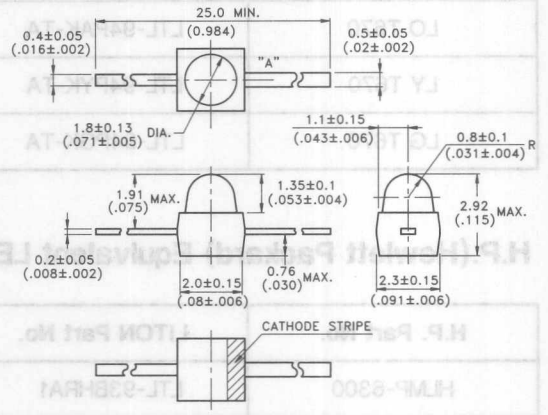
Features

- Subminiature package style.
- Low package profile.
- Axial leads.
- Wide viewing Angle.
- Long life solid state reliability.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode. The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode. The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode. The GaAlAs Red source color are Gallium Aluminum Arsenide Red Light Emitting Diode.
Lamps in this series of solid state indicators are molded in an axial lead subminiature package of molded epoxy. Size makes these lamp suitable for PC board mounting in space sensitive application.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. LTL-93BCK1, 93BCA1 "A" identify anode, other item "A" identify cathode.
4. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
93BCK1 93BCA1	Water Clear Red	Non-diffused Diffused	GaAlAs Red
93BPK1 93BPA1	Water Clear Red	Non-diffused Diffused	Bright Red
93BEK1 93BHRA1	Water Clear Red	Non-diffused Diffused	Hi. Eff. Red
93BGK1 93BGA1	Water Clear Green	Non-diffused Diffused	Green
93BYK1 93BYA1	Water Clear Yellow	Non-diffused Diffused	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	GaAlAs Red	Bright Red	Hi.Eff. Red	Green	Yellow	Unit
Power Dissipation	100	40	100	100	60	mW
Peak Forward Current (1/10 Duty Cycle,0.1ms Pulse Width)	200	60	120	120	80	mA
Continuous Forward Current	40	15	30	30	20	mA
Derating Linear From 50 ℃	0.5	0.15	0.4	0.4	0.25	mA/ ℃
Reverse Voltage	4	5	5	5	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃					
Storage Temperature Range	-55 ℃ to + 100 ℃					
Wave Soldering Temperature	260 ℃ for 3 seconds					

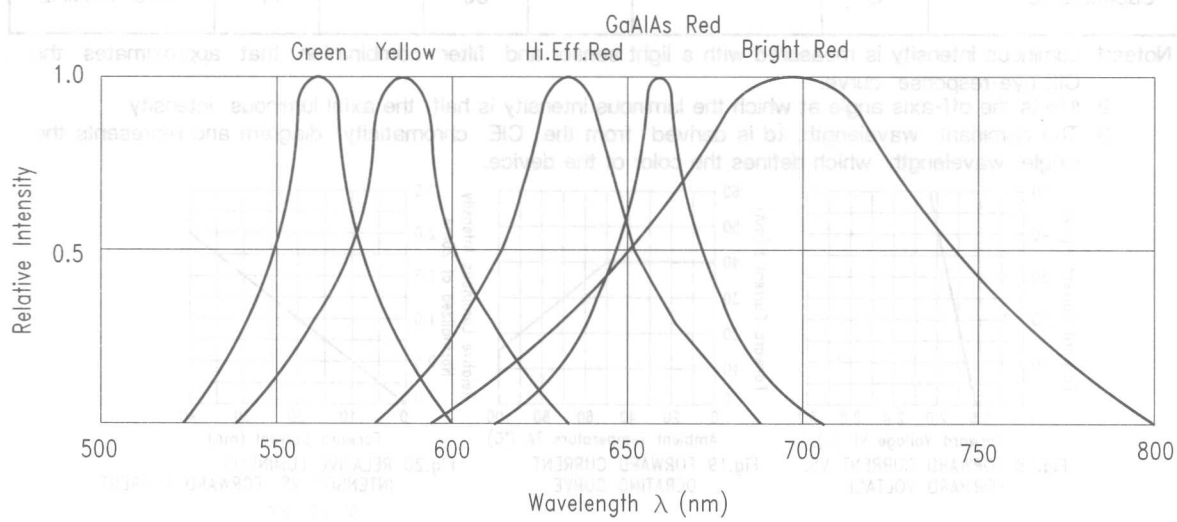


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	93BCK1 93BCA1	40 25	200 60		mcd	IF=20mA Note 1
Viewing Angle	2 θ 1/2	93BCK1 93BCA1		34 90		deg	Note 2 (Fig.22)
Peak Emission Wavelength	λ P			660		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λ d			638		nm	Note 3
Spectral Line Half-Width	Δ λ			20		nm	
Forward Voltage	VF			1.8	2.4	V	IF=20mA
Reverse Current	IR				100	μA	VR=4V
Capacitance	C			30		PF	VF=0 f=1MHZ

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye response curve.
2. θ1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

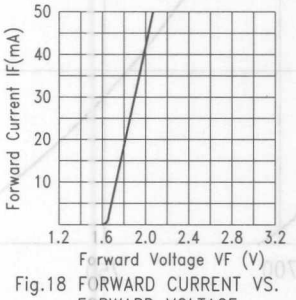


Fig.18 FORWARD CURRENT VS. FORWARD VOLTAGE

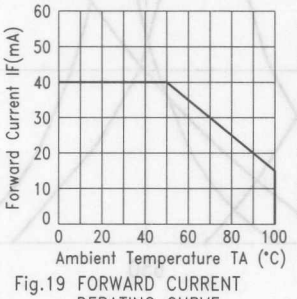


Fig.19 FORWARD CURRENT DERATING CURVE

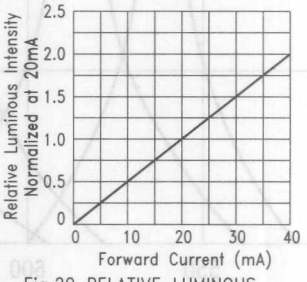


Fig.20 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

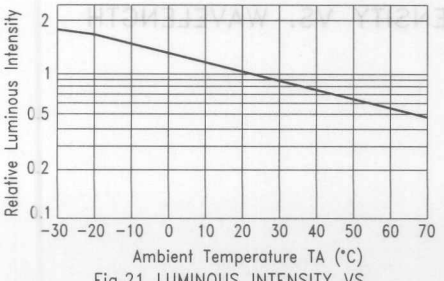


Fig.21 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

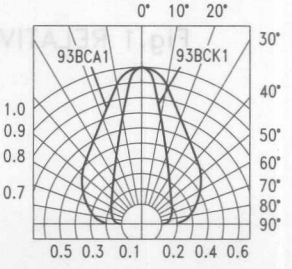


Fig.22 SPATIAL DISTRIBUTION

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	93BPK1 93BEK1 93BGK1 93BYK1	2.5 5.6 5.6 5.6	8.7 19.0 19.0 19.0		mcd	IF=10mA Note 1
Viewing Angle	2 θ 1/2	93BPK1 93BEK1 93BGK1 93BYK1		34		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λ P	93BPK1 93BEK1 93BGK1 93BYK1		697 635 565 585		nm	Measurement @ peak (Fig.1)
Dominant Wave-length	λ d	93BPK1 93BEK1 93BGK1 93BYK1		657 621 569 588		nm	Note 3
Spectral Line Half-Width	Δ λ	93BPK1 93BEK1 93BGK1 93BYK1		90 40 30 35		nm	
Forward Voltage	VF	93BPK1 93BEK1 93BGK1 93BYK1		2.1 2.0 2.1 2.1	2.8 2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	93BPK1 93BEK1 93BGK1 93BYK1			100	μA	VR=5V
Capacitance	C	93BPK1 93BEK1 93BGK1 93BYK1		55 20 35 15		PF	VF=0 f=1MHZ

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Electrical / Optical Characteristics and Curves at Ta= 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	93BPA1 93BHRA1 93BGA1 93BYA1	0.5 2.5 1.1 1.7	1.7 3.7 3.7 3.1		mcd	IF=10mA Note 1
Viewing Angle	2 θ 1/2	93BPA1 93BHRA1 93BGA1 93BYA1		90		deg	Note 2 (Fig.15)
Peak Emission Wavelength	λ P	93BPA1 93BHRA1 93BGA1 93BYA1		697 635 565 585		nm	Measurement @ peak (Fig.1)
Dominant Wave length	λ d	93BPA1 93BHRA1 93BGA1 93BYA1		657 621 569 588		nm	Note 3
Spectral Line Half-Width	Δ λ	93BPA1 93BHRA1 93BGA1 93BYA1		90 40 30 35		nm	
Forward Voltage	VF	93BPA1 93BHRA1 93BGA1 93BYA1		2.1 2.0 2.1 2.1	2.8 2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	93BPA1 93BHRA1 93BGA1 93BYA1			100	μA	VR=5V
Capacitance	C	93BPA1 93BHRA1 93BGA1 93BYA1		55 20 35 15		PF	VF=0 f=1MHZ

NOTES:1.Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.

2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

3.The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

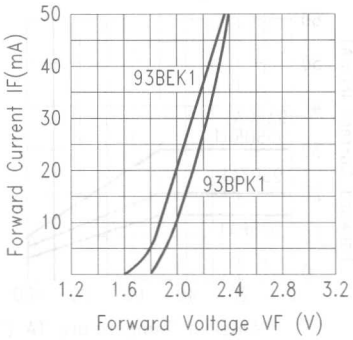


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

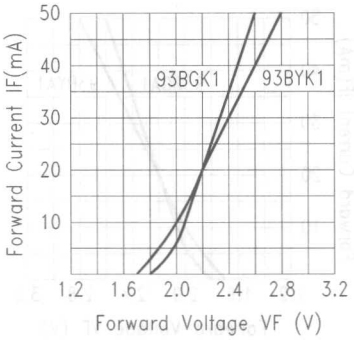


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

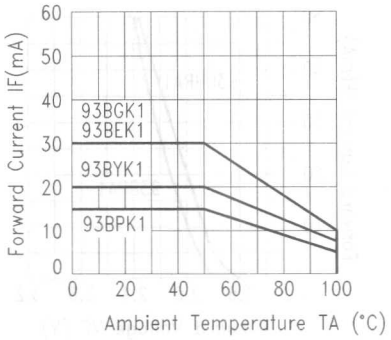


Fig.4 FORWARD CURRENT DERATING CURVE

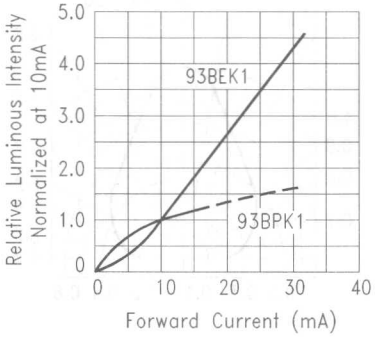


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

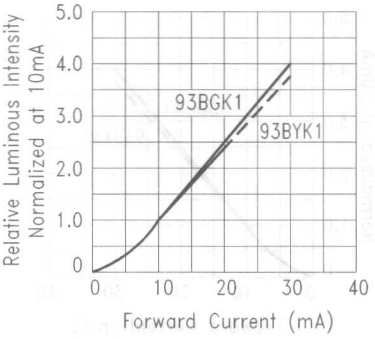


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

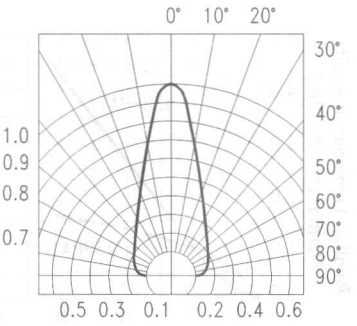


Fig.7 SPATIAL DISTRIBUTION

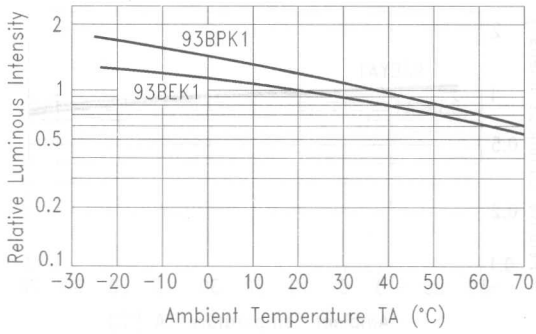


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

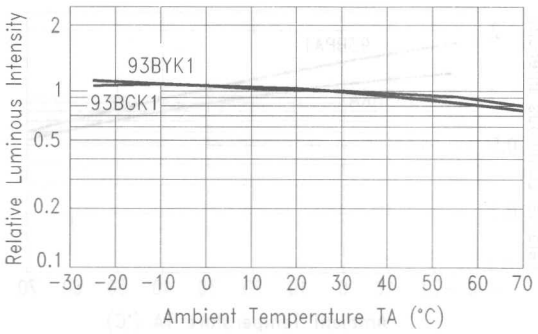


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

SMD LED PRODUCTS

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

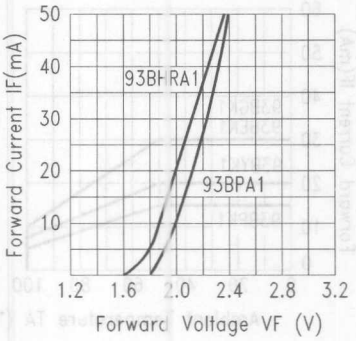


Fig.10 FORWARD CURRENT VS. FORWARD VOLTAGE

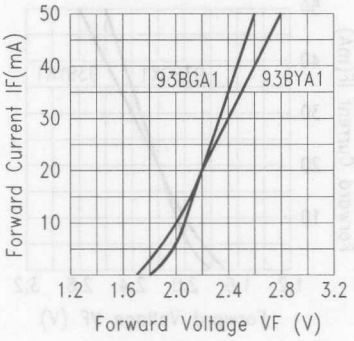


Fig.11 FORWARD CURRENT VS. FORWARD VOLTAGE

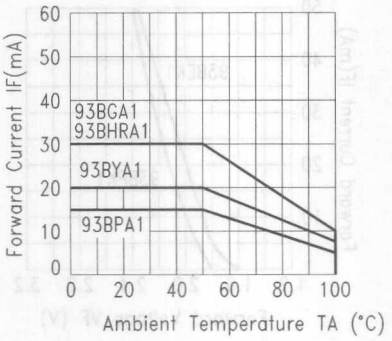


Fig.12 FORWARD CURRENT DERATING CURVE

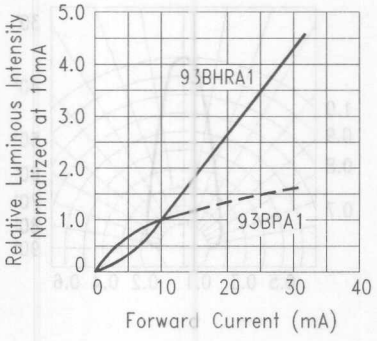


Fig.13 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

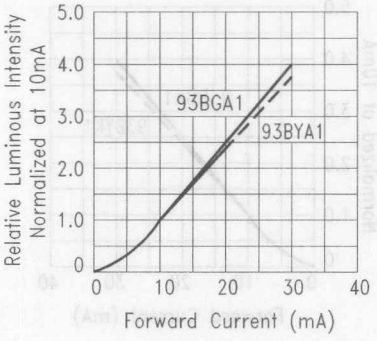


Fig.14 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

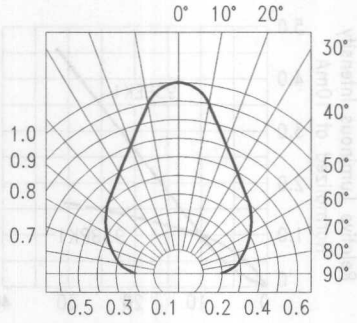


Fig.15 SPATIAL DISTRIBUTION

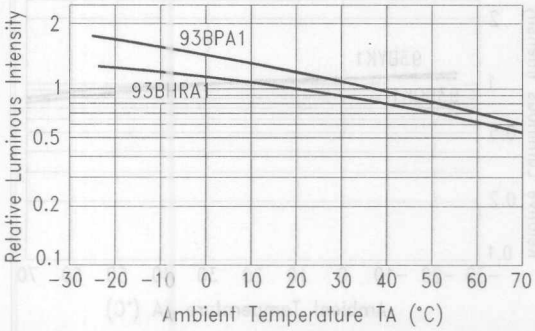


Fig.16 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

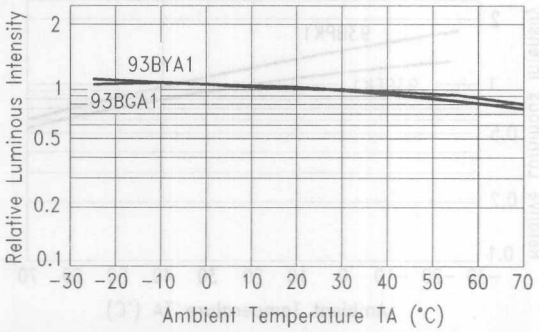


Fig.17 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

Surface Mount Option For Subminiature Lamps -Gull Wing / Yoke Lead / Z-Bend Configuration

Features

- Gull Wing lead or Yoke lead or Z-Bend configuration, individual subminiature lamps.
- Compatible with automatic placement equipment.
- Compatible with IR-Reflow & vapor phase reflow solder process.
- Low package profile.
- Wide viewing angle.
- Long LIFE-SOLID state reliability.
- Individual subminiature lamps are supplied in 12mm carrier tape.

Description

These subminiature solid state lamps are encapsulated in an axial lead package of molded epoxy. They utilize a tinted, diffused lens providing high on-off contrast and wide angle viewing. The leads of this device are bent in a gull wing or yoke lead configuration for surface mounting. The device can be mounted using automatic placement equipment. The individual subminiature lamps is supplied in 12mm tape on seven inch reels per ANSI / EIA standard RS-481 specifications. The lamp can be mounted with either batch or in line vapor phase reflow solder processes.

Reflow Solder Rating

Absolute Maximum Rating

Vapor Phase Soldering Temperature	215 ℃ for 3 minutes
IR-Reflow	260 ℃ for 5 minutes

Absolute Maximum Ratings and Electrical / Optical Characteristics

The absolute maximum ratings and electrical/optical specifications are identical to the basic catalog device except for the vapor phase soldering rating as specified at left.

Devices Selection Guide

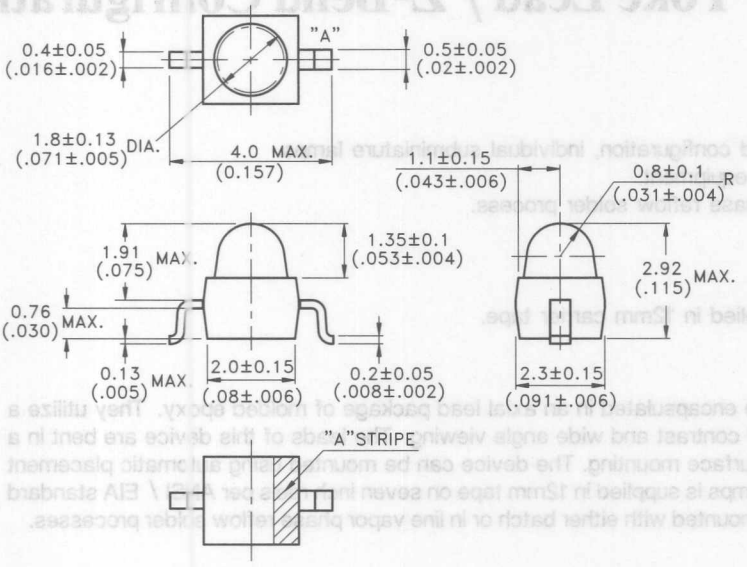
Option	Description
Option M-TA	Individual subminiature lamps in gull wing configuration. Supplied in 12 mm tape on seven inch reels; 1500 pieces per reel. Minimum order quantity and order increment are 1500 pieces.
Option P-TA	Individual subminiature lamps in yoke lead configuration. Supplied in 12 mm tape on seven inch reels; 1500 pieces per reel. Minimum order quantity and order increment are 1500 pieces.
Option Z-TA	Individual subminiature lamps in z-bend configuration. Supplied in 12 mm tape on seven inch reels; 1500 pieces per reel. Minimum order quantity and order increment are 1500 pieces.

Devices Selection Guide
Part Number: LTL-XXXX

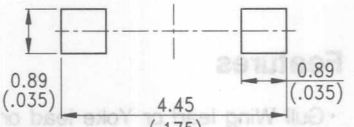
Hi.Eff.Red	Yellow	Green	Device Description	Device Outline Drawing
93BEKM	93BYKM	93BGKM	Non-diffused, Gull Wing	A
93BEKP	93BYKP	93BGKP	Non-diffused, Yoke Lead	B
93BEKZ	93BYKZ	93BGKZ	Non-diffused, Z-Bend	C

(A) GULL WING

*Package Dimensions

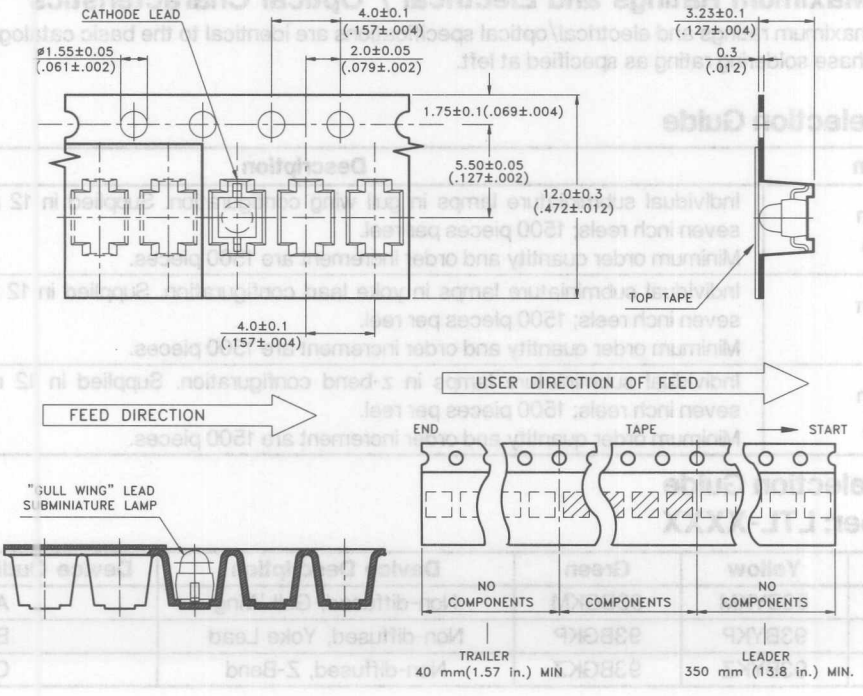


*Pad Dimensions



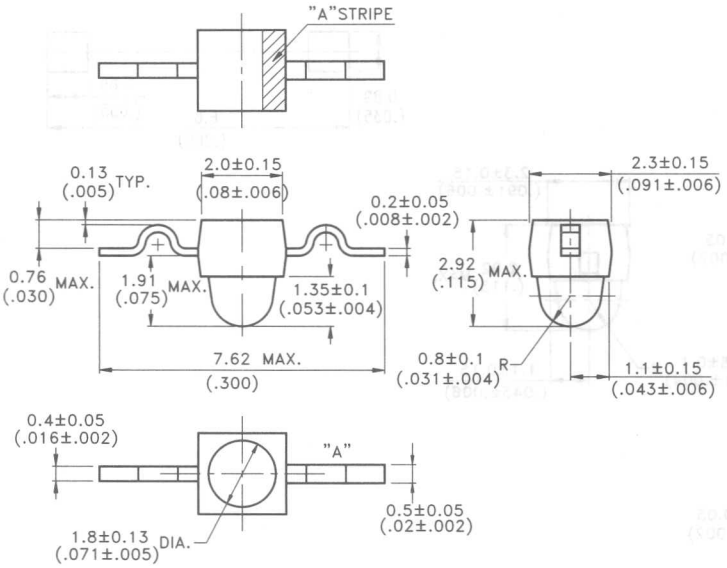
Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. "A" identify cathode lead is by the color stripe .
4. Specifications are subject to change without notice.

*12mm Tape "GULL WING" Option M-TA

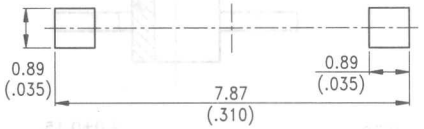


(B) YOKE LEAD

*Package Dimensions

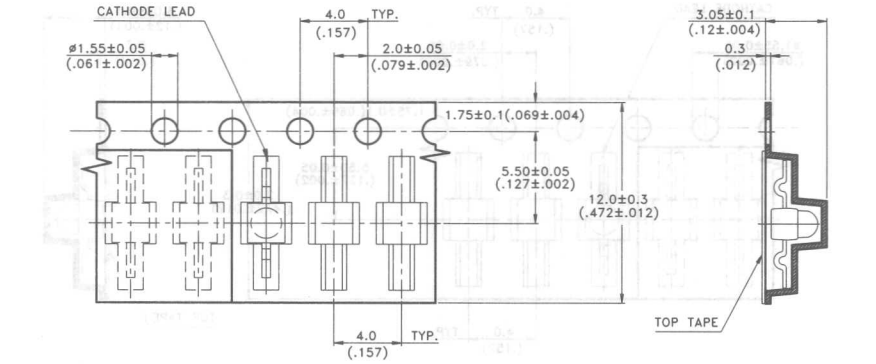


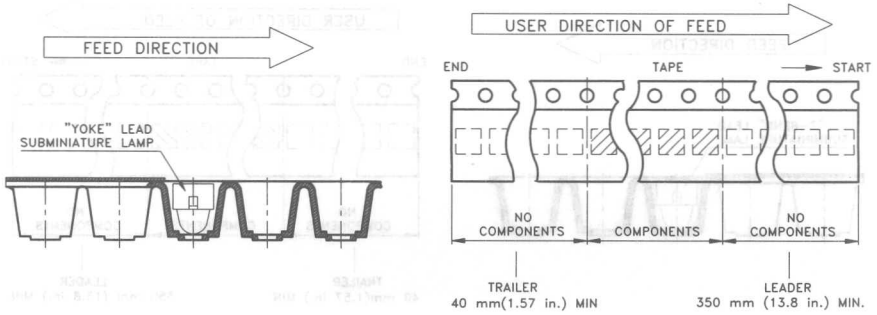
*Pad Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. "A" identify cathode lead is by the color stripe .
4. Specifications are subject to change without notice.

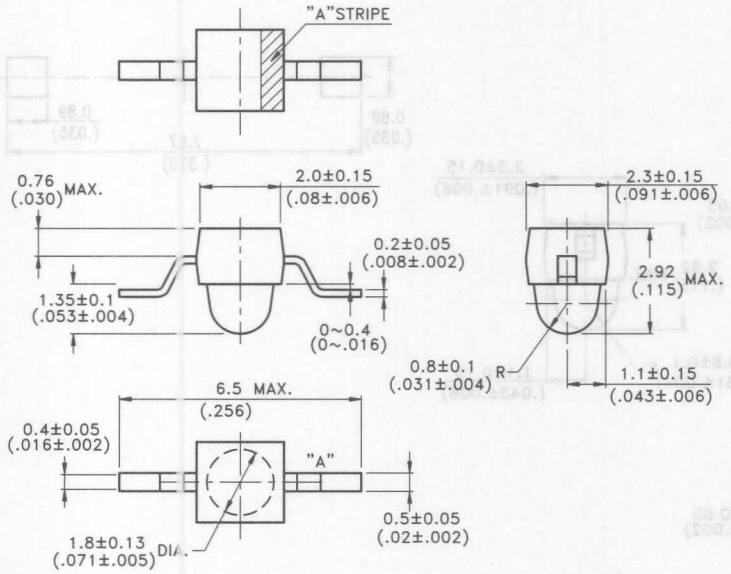
*12mm Tape "YOKE LEAD" Option P-TA



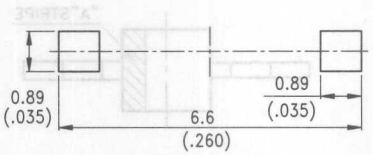


(C) Z-BEND

*Package Dimensions



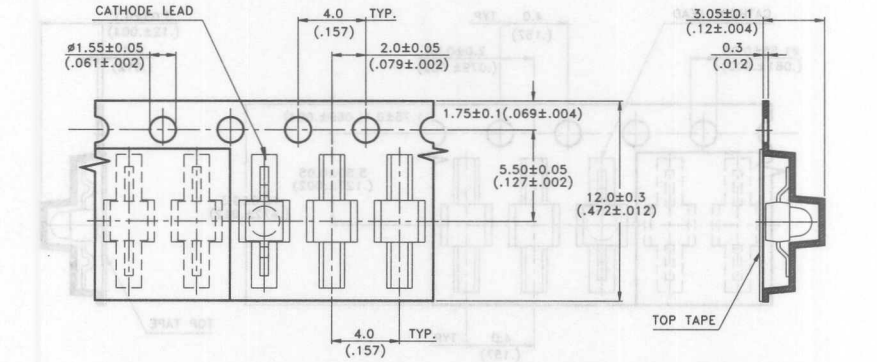
*Pad Dimensions

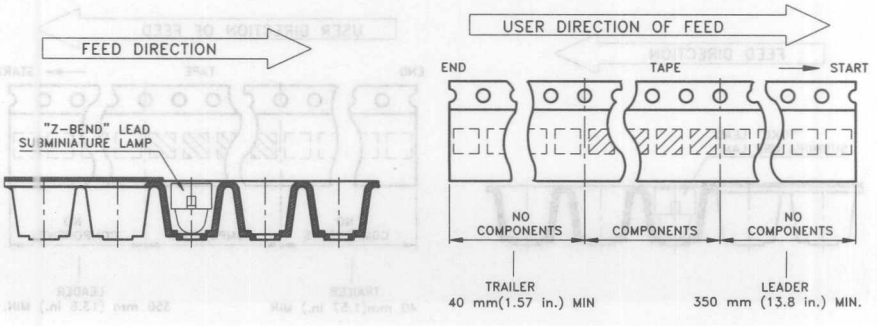


Notes:

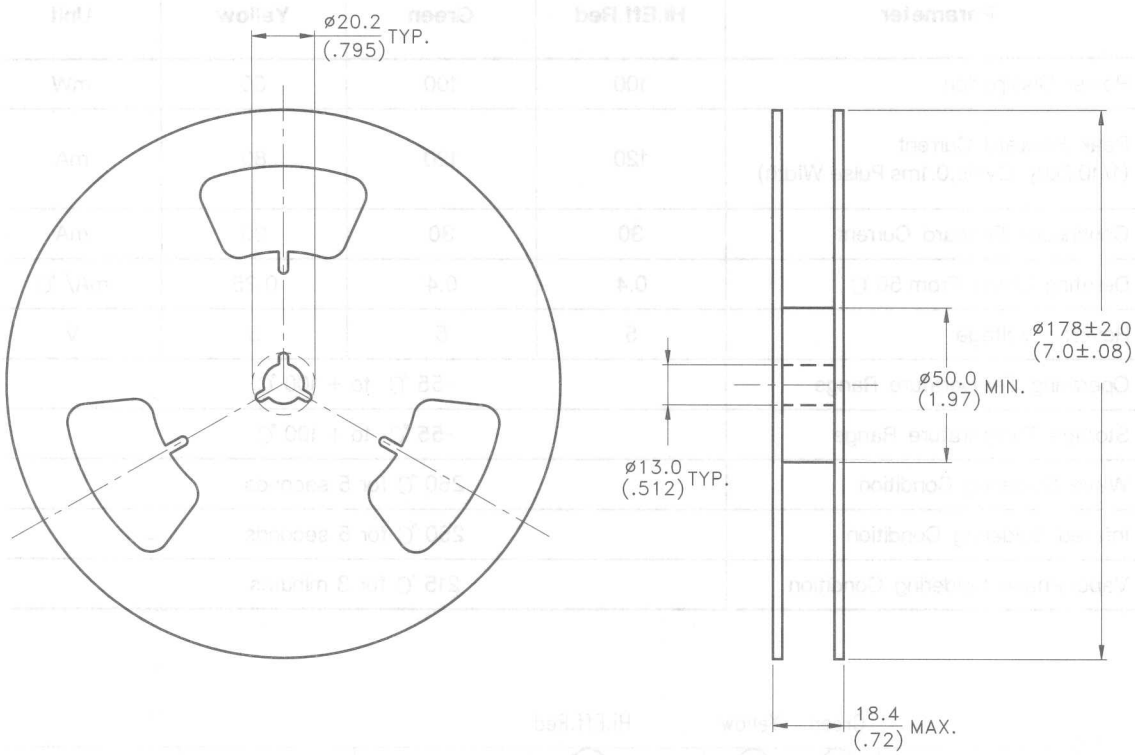
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. "A" identify cathode lead is by the color stripe .
4. Specifications are subject to change without notice.

*12mm Tape "Z-BEND" Option Z-TA





*Package Dimensions of Reel



Notes:
1. Empty component pockets sealed with top cover tapes.
2. 7 inch reel-1500 pieces per reel.
3. The maximum number of consecutive missing lamps are two.
4. In accordance with ANSI/EIA RS-481 specifications, the cathode is oriented towards the sprocket hole.

Absolute Maximum Ratings at Ta=25℃

Parameter	Hi.Eff.Red	Green	Yellow	Unit
Power Dissipation	100	100	60	mW
Peak Forward Current (1/10 Duty Cycle,0.1ms Pulse Width)	120	120	80	mA
Continuous Forward Current	30	30	20	mA
Derating Linear From 50℃	0.4	0.4	0.25	mA/ ℃
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃			
Storage Temperature Range	-55 ℃ to + 100 ℃			
Wave Soldering Condition	260 ℃ for 5 seconds			
Infared Soldering Condition	260 ℃ for 5 seconds			
Vapor Phase Soldering Condition	215 ℃ for 3 minutes			

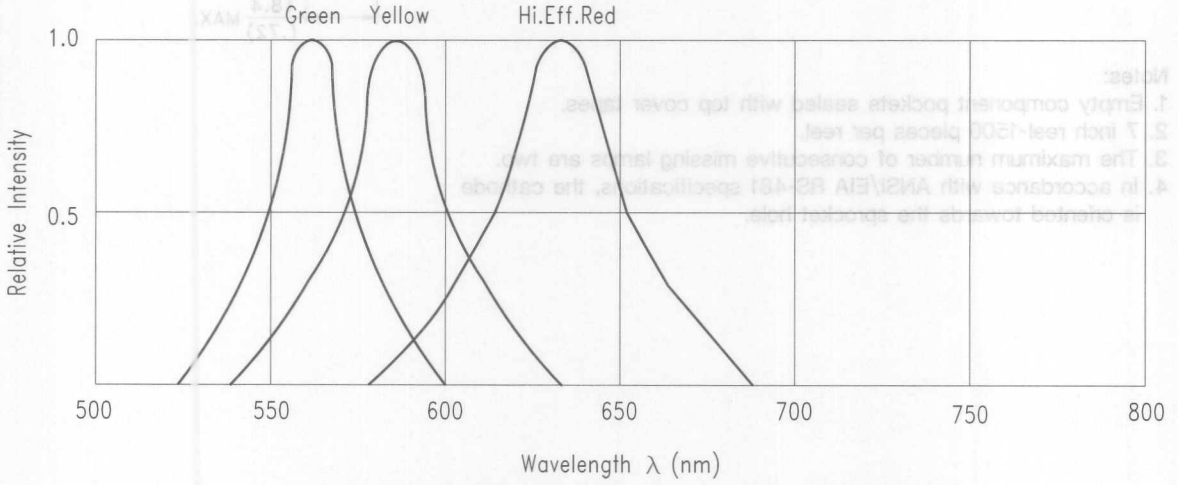


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta= 25 ℃

Parameter	Symbol	Part No. LTL-	Min	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Hi.Eff.Red Green Yellow	5.6 5.6 5.6	19 19 19		mcd	IF = 10mA Note 1
Viewing Angle	2 θ ½	Hi.Eff.Red Green Yellow		34		deg	Note 2 (Fig.6)
Peak Emission Wave-length	λ P	Hi.Eff.Red Green Yellow		635 565 585		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λ d	Hi.Eff.Red Green Yellow		621 569 588		nm	Note 3
Spectral Line Half-Width	Δ λ	Hi.Eff.Red Green Yellow		40 30 35		nm	
Forward Voltage	VF	Hi.Eff.Red Green Yellow		2.0 2.1 2.1	2.8 2.8 2.8	V	IF = 20mA
Reverse Current	IR	Hi.Eff.Red Green Yellow			100	μA	VR = 5V
Capacitance	C	Hi.Eff.Red Green Yellow		20 35 15		PF	VF = 0 , f = 1 MHZ

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical / Optical Characteristic Curves (25℃ Ambient Temperature Unless Otherwise Noted)

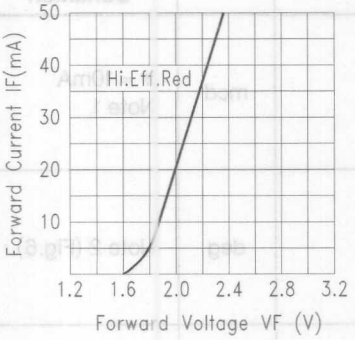


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

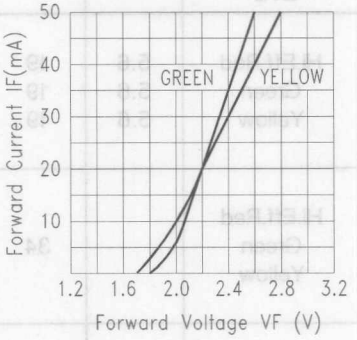


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

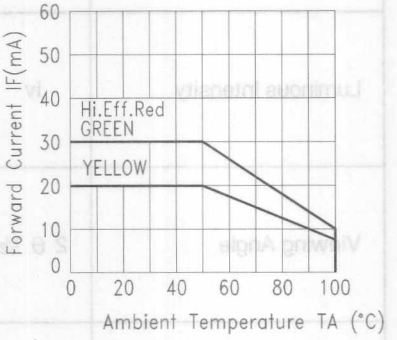


Fig.4 FORWARD CURRENT DERATING CURVE

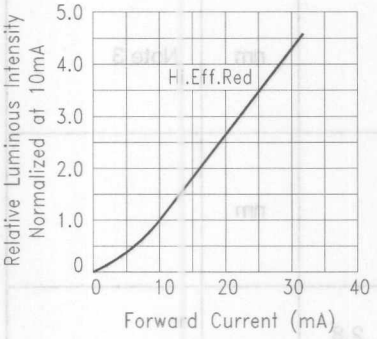


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

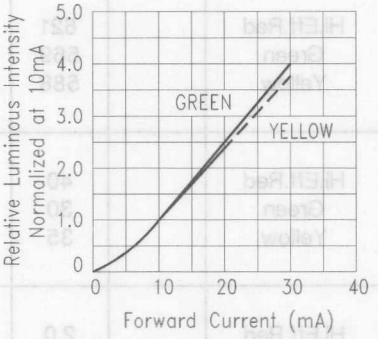


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

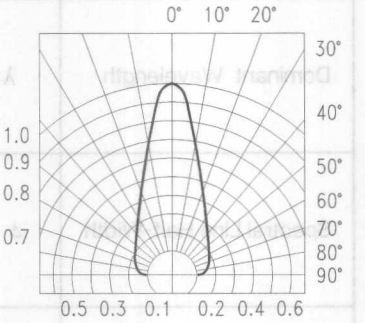


Fig.7 SPATIAL DISTRIBUTION

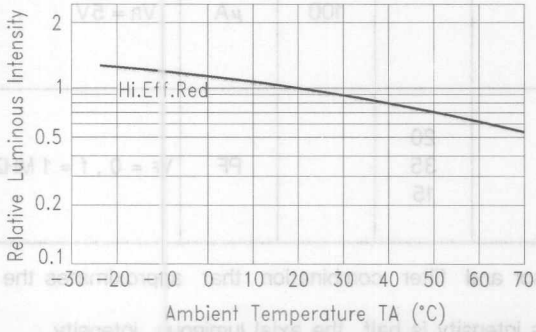


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

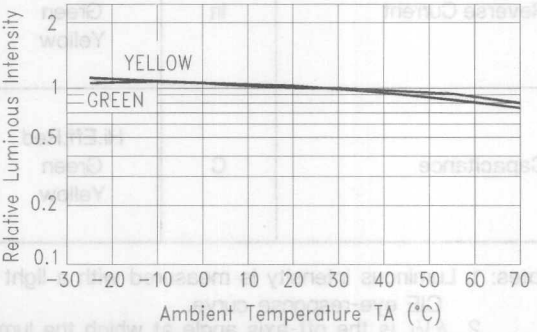


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

PLCC Lamps

LTL-94PCK-TA	GaAlAs Red	LTL-94PEK-TA	Orange
LTL-94PURK-TA	GaAlAs Red	LTL-94PYK-TA	Yellow
LTL-94PGK-TA	Green	LTL-94PAK-TA	Amber

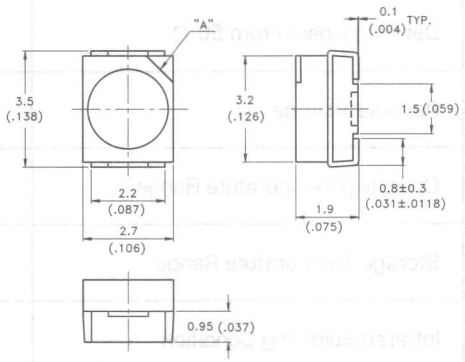
Features

- Package in 8mm tape on 7" diameter reels.
- Compatible with automatic placement equipment.
- Compatible with infrared and vapor phase reflow solder process.
- EIA STD package.
- I.C. compatible.

Description

The GaAlAs Red source color devices are made with Gallium Aluminum Arsenide Red Light Emitting Diode.
The Orange and Amber source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phoshpide on Gallium Phoshide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yelow Light Emitting Diode.

Package Dimensions



Devices

Part No. LTL.	Lens		Source Color
	Color	Diffusion	
94PURK-TA 94PCK-TA	Water Clear	Non-diffused	GaAlAs Red
94PEK-TA	Water Clear	Non-diffused	Orange
94PGK-TA	Water Clear	Non-diffused	Green
94PYK-TA	Water Clear	Non-diffused	Yellow
94PAK-TA	Water Clear	Non-diffused	Amber

Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.2mm(.008")unless otherwise noted.
3. LTL-94PEK-TA, 94PGK-TA, 94PYK-TA, 94PAK-TA, "A" identify cathode.
   LTL-94PURK-TA, 94PCK-TA, "A" identify anode.

SMD LED PRODUCTS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	GaAlAs Red	Amber Orange	Green	Yellow	Unit
Power Dissipation	100	100	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	120	120	80	mA
Continuous Forward Current	40	30	30	20	mA
Derating Linear From 50 ℃	0.8	0.6	0.6	0.4	mA/ ℃
Reverse Voltage	4	5	5	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃				
Storage Temperature Range	-55 ℃ to + 100 ℃				
Infrared Soldering Condition	260 ℃ For 5 Seconds				
Vapor Phase Soldering Condition	215 ℃ For 3 Minutes				
Wave Soldering Temperatrue	260 ℃ For 3 Seconds				

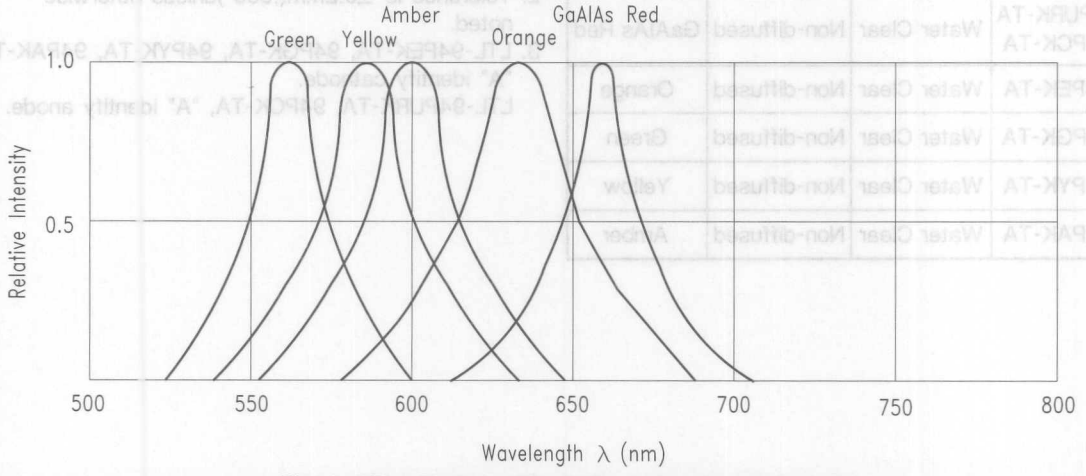


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics at Ta=25 ℃

Parameter	SYMBOL	Part No.(LTL-)	Min.	Typ.	Mix.	Unit	Test Condition
Luminous Intensity	Iv	94PEK-TA 94PGK-TA 94PYK-TA 94PAK-TA	1.7 1.7 1.7 1.7	8.0 8.0 6.0 8.0		mcd	IF=10mA (Note 1)
Viewing Angle	2 θ 1/2	All		120		deg	Note 2(Fig.7)
Peak Emission Wavelength	λ P	94PEK-TA 94PGK-TA 94PYK-TA 94PAK-TA		635 565 585 610		nm	Measurement @Peak (FIG.1)
Dominant Wavelergth	λ d	94PEK-TA 94PGK-TA 94PYK-TA 94PAK-TA		621 569 588 602		nm	Note 3
Spectral Line Half-Width	Δ λ	94PEK-TA 94PGK-TA 94PYK-TA 94PAK-TA		40 30 35 35		nm	
Forward Voltage	VF	94PEK-TA 94PGK-TA 94PYK-TA 94PAK-TA		2.0 2.1 2.1 2.1	2.8	V	IF=20mA
Reverse Current	IR	94PEK-TA 94PGK-TA 94PYK-TA 94PAK-TA			100	μA	VR=5V
Capacitance	C	94PEK-TA 94PGK-TA 94PYK-TA 94PAK-TA		20 35 15 10		PF	VF=0 f=1MHZ

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Electrical / Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Par No.(LTL-)	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	94PURK-TA 94PCK-TA	29 20	80.0 50.0		mcd	IF=20mA (Note 1)
Viewing Angle	2 θ 1/2	94PURK-TA 94PCK-TA		120		deg	Note 2 (Fig.7)
Peak Emission Wavelength	λ P	94PURK-TA 94PCK-TA		660		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λ d	94PURK-TA 94PCK-TA		638		nm	Note 3
Spectral Line Half-Width	Δ λ	94PURK-TA 94PCK-TA		20		nm	
Forward Voltage	VF	94PURK-TA 94PCK-TA		1.8	2.4	V	IF=20mA
Reverse Current	IR	94PURK-TA 94PCK-TA			100	μA	VR=4V
Capacitance	C	94PURK-TA 94PCK-TA		30		PF	VF=0 f=1MHZ

NOTES: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. θ1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristics Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

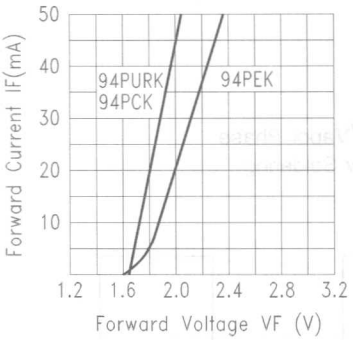


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

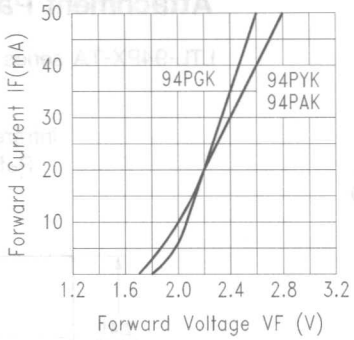


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

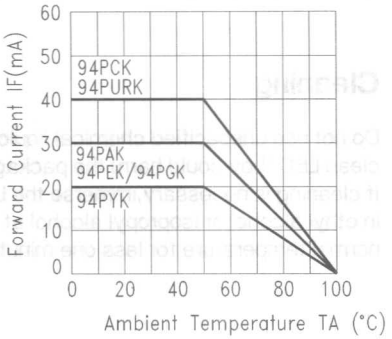


Fig.4 FORWARD CURRENT DERATING CURVE

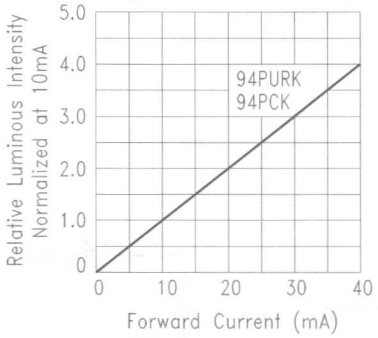


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

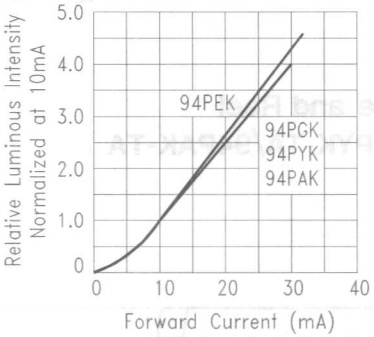


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

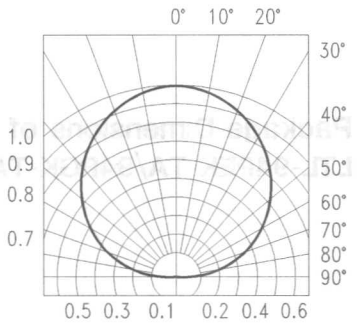


Fig.7 SPATIAL DISTRIBUTION

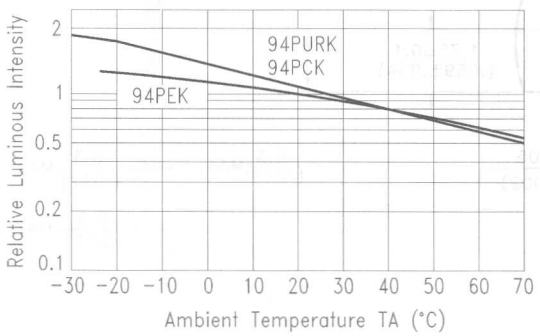


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

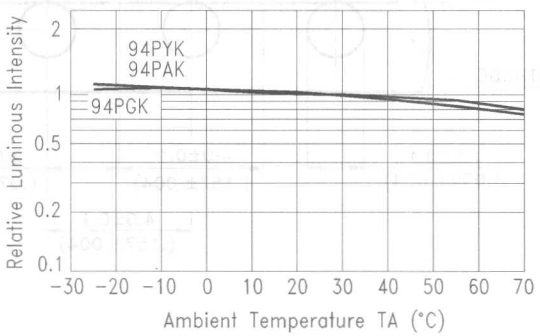


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

SMD LED PRODUCTS

User Guide

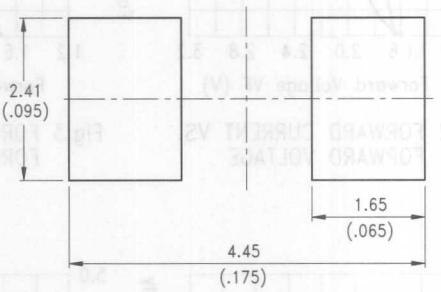
Cleaning

Do not use unspecified chemical liquid to clean LED they could harm the package . If cleaning is necessary,immerse the LED in ethyl alcohol or isopropyl alcohol at normal temperature for less one minute.

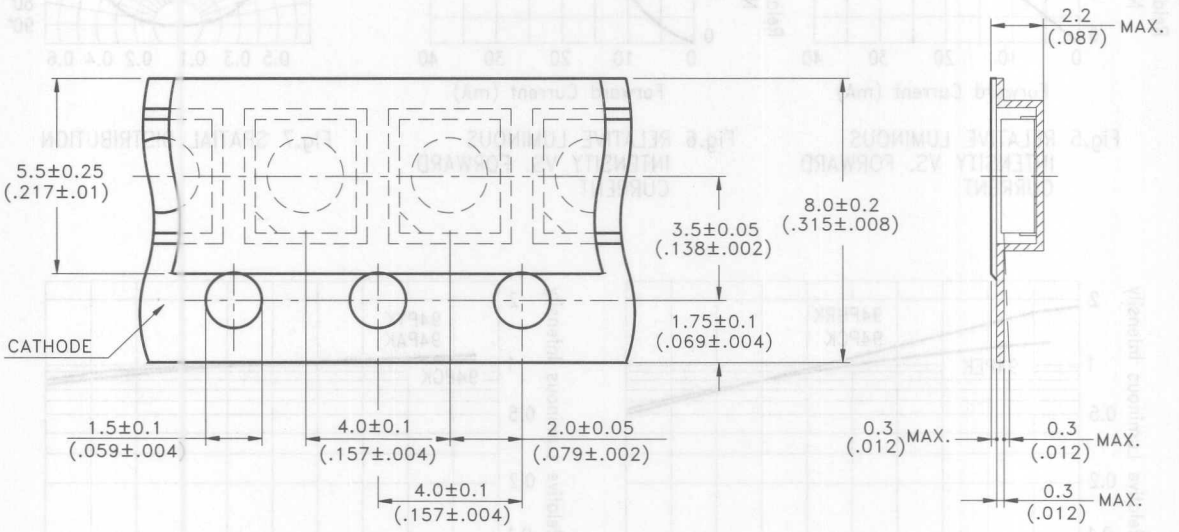
Recommend Printed Circuit Board Attachment Pad

LTL-94PX-TA series

Infrared/Vapor Phase Reflow Soldering

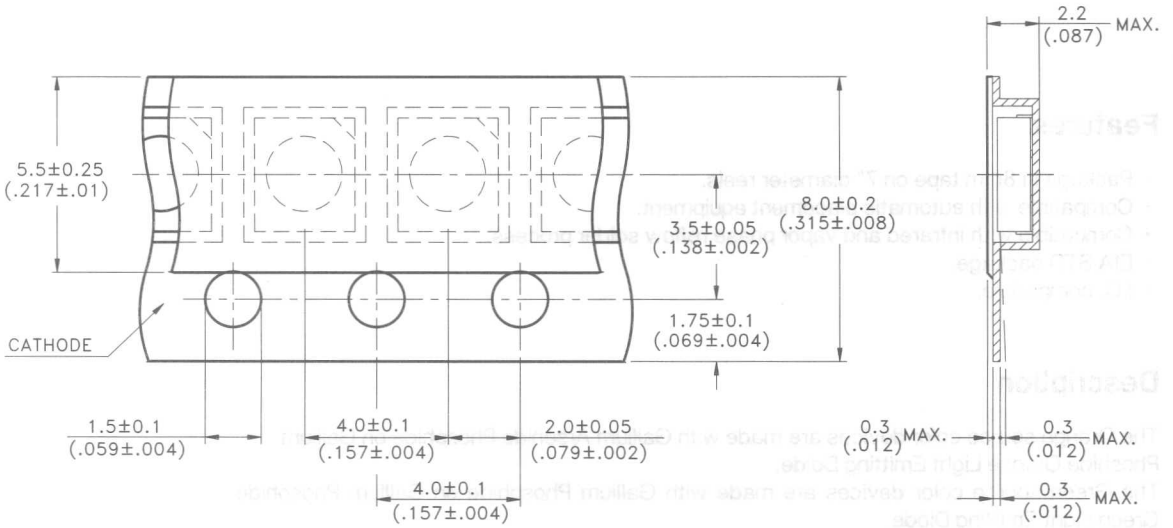


Package Dimensions of Tape and Reel
LTL-94PEK-TA/94PGK-TA/94PYK-TA/94PAK-TA

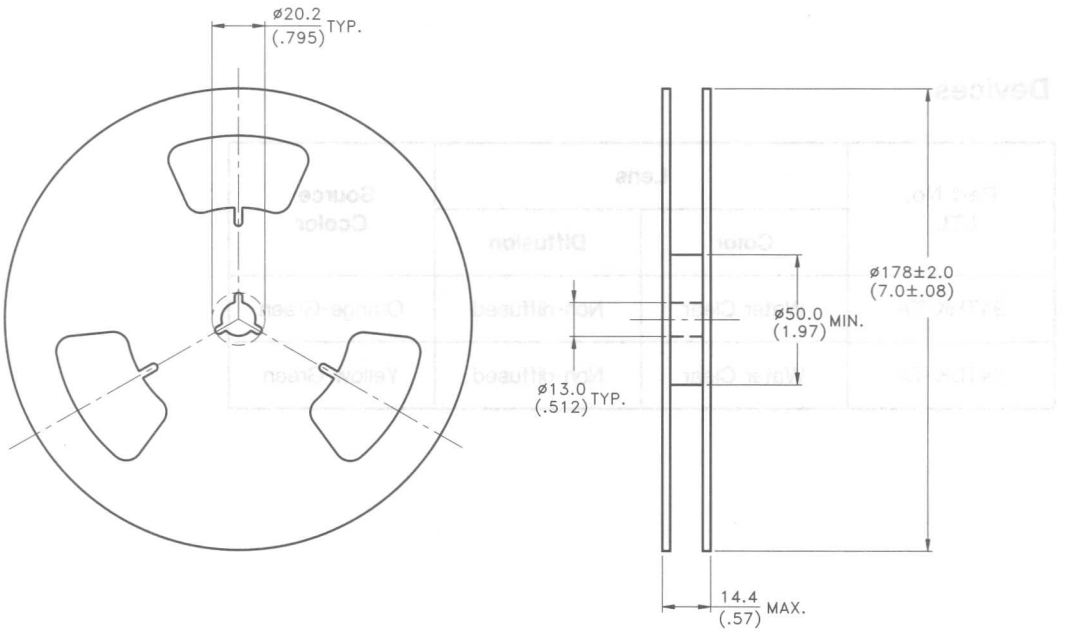


Package Dimensions of Tape and Reel

LTL-94PURK-TA/94PCK-TA



Note: All dimensions are in millimeters (inches).



Notes: 1. Empty component pockets sealed with top cover tape.
2. 7 inch reel - 1500 pieces per reel.
3. The maximum number of consecutive missing lamp are two.
4. In accordance with ANSI/EIA RS-481 specifications the cathode is oriented towards the tape sprocket hole.

LITEON

PLCC Lamps

LTL-94THK-TA Orange-Green
LTL-94TDK-TA Yellow-Green

Features

- Package in 8mm tape on 7" diameter reels.
- Compatible with automatic placement equipment.
- Compatible with infrared and vapor phase reflow solder process.
- EIA STD package.
- I.C. compatible.

Description

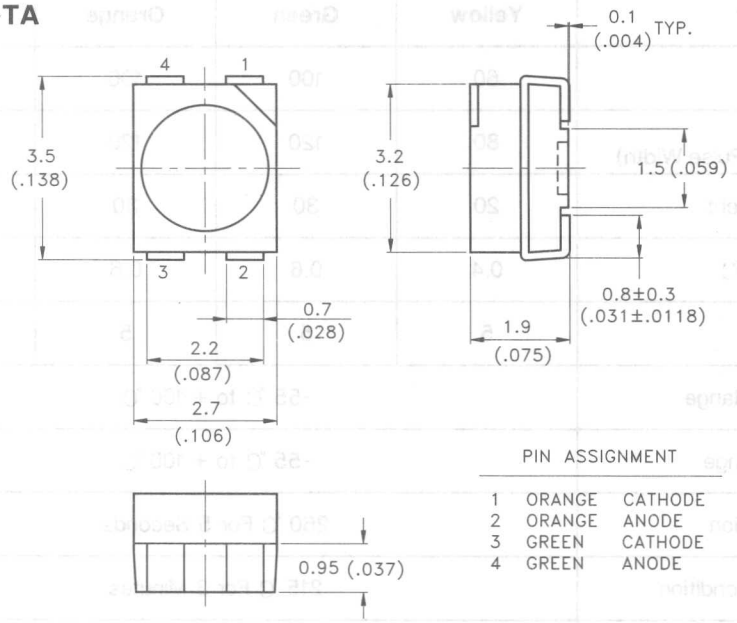
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phoshide Orange Light Emitting Doide.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Doide.

Devices

Part No. LTL-	Lens		Source Ccolor
	Color	Diffusion	
94THK-TA	Water Clear	Non-diffused	Orange-Green
94TDK-TA	Water Clear	Non-diffused	Yellow-Green

Package Dimensions

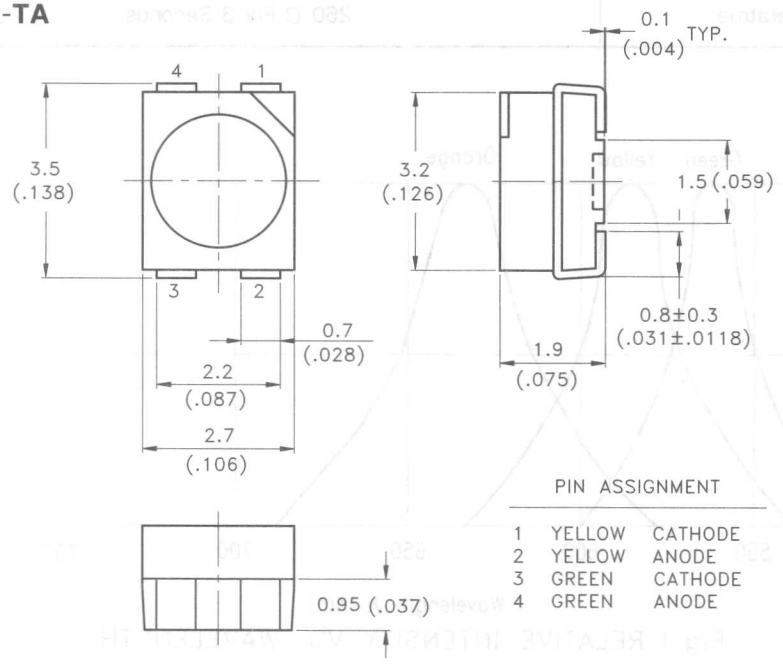
(A) 94THK-TA



PIN ASSIGNMENT

1	ORANGE	CATHODE
2	ORANGE	ANODE
3	GREEN	CATHODE
4	GREEN	ANODE

(B)94TDK-TA



PIN ASSIGNMENT

1	YELLOW	CATHODE
2	YELLOW	ANODE
3	GREEN	CATHODE
4	GREEN	ANODE

Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.2mm (.008") unless otherwise noted.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Green	Orange	Unit
Power Dissipation	60	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	120	120	mA
Continuous Forward Current	20	30	30	mA
Derating Linear From 50 ℃	0.4	0.6	0.6	mA/ ℃
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃			
Storage Temperature Range	-55 ℃ to + 100 ℃			
Infrared Soldering Condition	260 ℃ For 5 Seconds			
Vapor Phase Soldering Condition	215 ℃ For 3 Minutes			
Wave Soldering Temperatrue	260 ℃ For 3 Seconds			

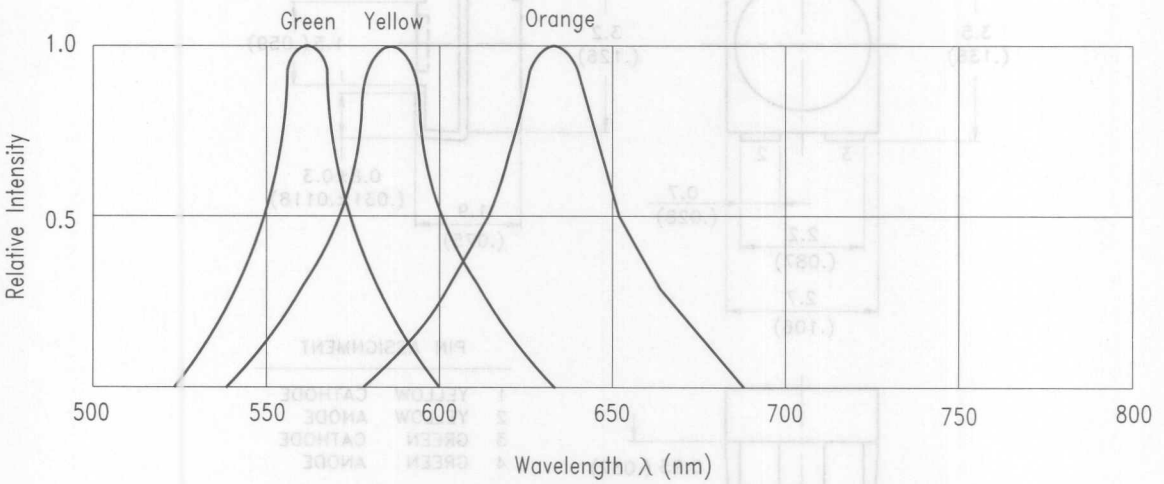


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-94THK	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Orange Green	3.7 3.7	8.0 8.0		mcd	IF=20mA Note 1
Viewing Angle	2 θ ½	Orange Green		120		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λ P	Orange Green		630 565		nm	Measurement @peak (Fig.1)
Dominant Wavelength	λ d	Orange Green		621 569		nm	Note 3
Spectral Line Half-Width	Δ λ	Orange Green		40 30		nm	
Forward Voltage	VF	Orange Green		2.0 2.1	2.8 2.8	V	IF=20mA
Reverse Current	IR	Orange Green			100	μA	VR=5V
Capacitance	C	Orange Green		20 35		PF	VF=0 f=1MHZ

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

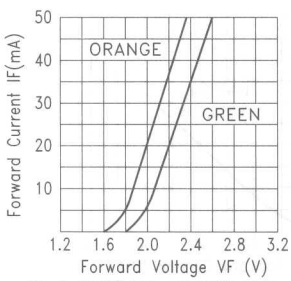


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

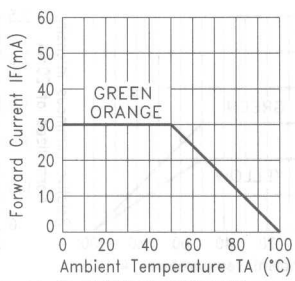


Fig.3 FORWARD CURRENT DERATING CURVE

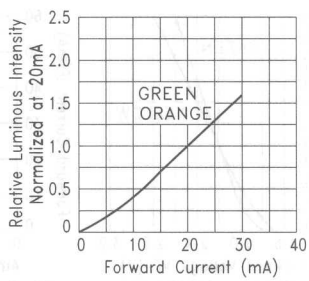


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

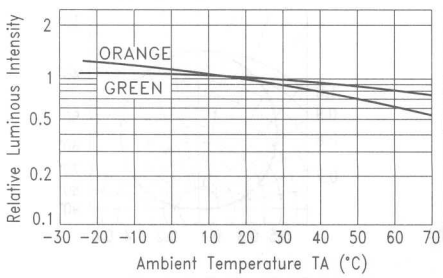


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

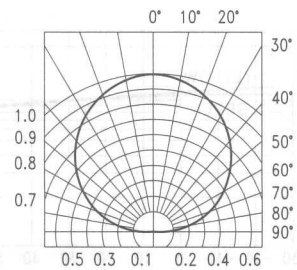


Fig.6 SPATIAL DISTRIBUTION

SMD LED PRODUCTS

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-94TDK	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Green Yellow	3.7 3.7	8.0 6.0		mcd	IF=20mA Note 1
Viewing Angle	2 θ 1/2	Green Yellow		120		deg	Note 2 (Fig.11)
Peak Emission Wavelength	λ P	Green Yellow		565 585		nm	Measurement @peak (Fig.1)
Dominant Wavelength	λ d	Green Yellow		569 588		nm	Note 3
Spectral Line Half-Width	Δ λ	Green Yellow		30 35		nm	
Forward Voltage	VF	Green Yellow		2.1	2.8	V	IF=20mA
Reverse Current	IR	Green Yellow			100	μA	VR=5V
Capacitance	C	Green Yellow		35 15		PF	VF=0 f=1MHZ

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

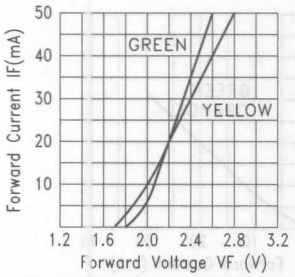


Fig.7 FORWARD CURRENT VS. FORWARD VOLTAGE

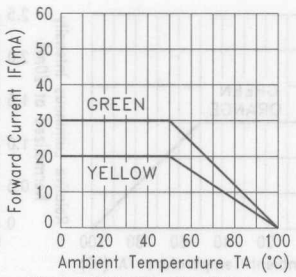


Fig.8 FORWARD CURRENT DERATING CURVE

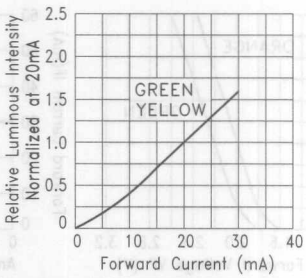


Fig.9 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

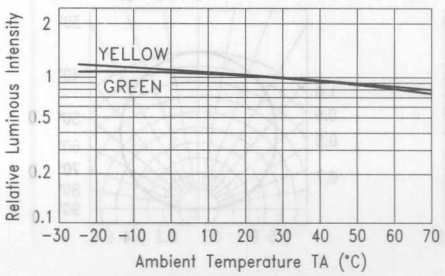


Fig.10 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

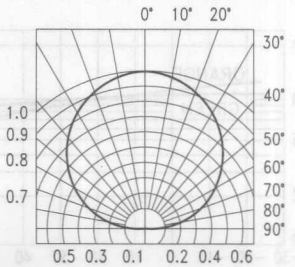


Fig.11 SPATIAL DISTRIBUTION

User Guide

Cleaning

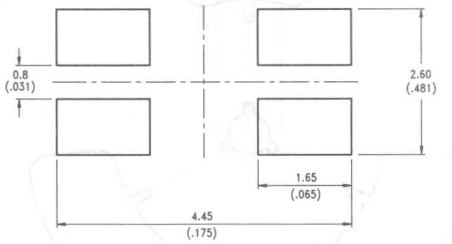
Do not use unspecified chemical liquid to clean LED they could harm the package.

If cleaning is necessary immerse the LED in ethyl alcohol or isopropyl alcohoa at normal temperature for less one minute.

Recommend Printed Circuit Board Attachment Pad

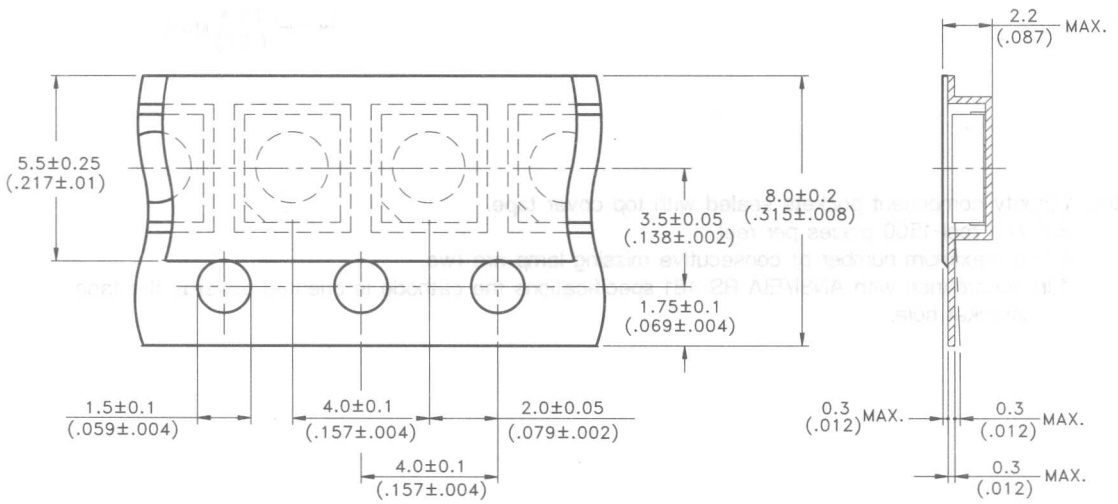
LTL-94THK-TA/94TDK-TA

Infrared/Vapor Phase
Reflow Soldering

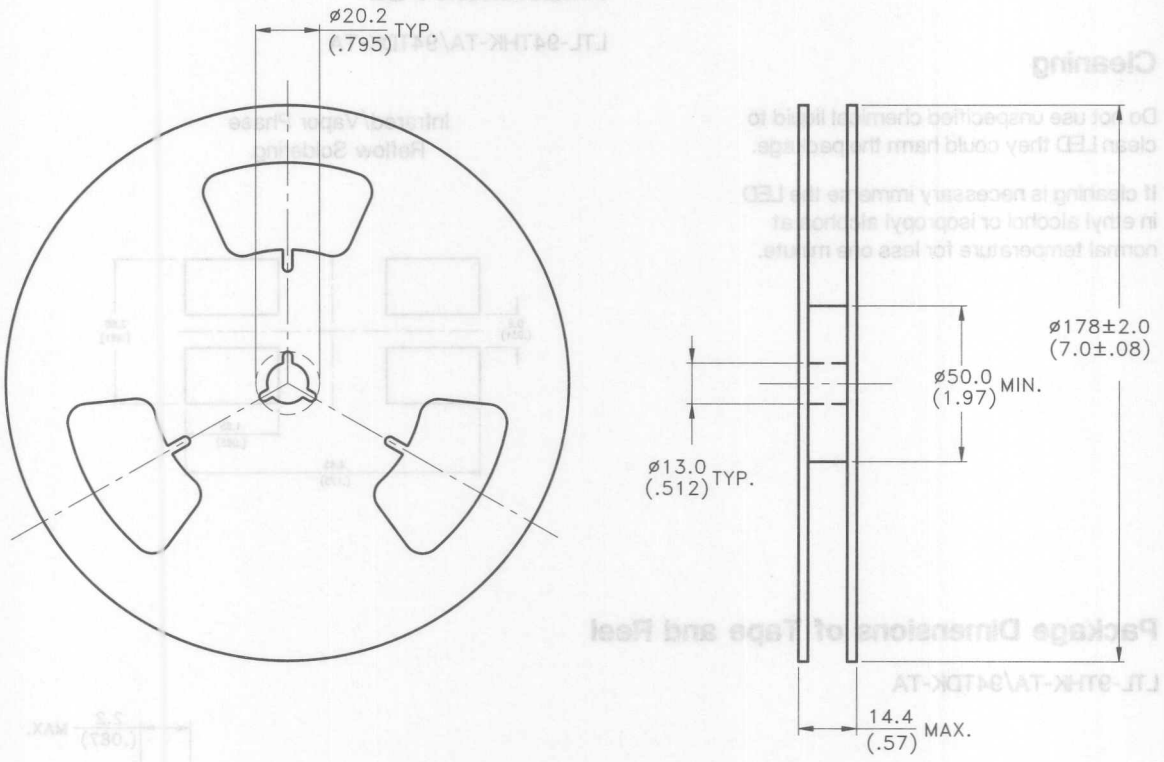


Package Dimensions of Tape and Reel

LTL-9THK-TA/94TDK-TA



SMD LED PRODUCTS



Notes: 1.Empty component pockets sealed with top cover tape.
2.7 inch reel-1500 pieces per reel.
3.The maximum number of consecutive missing lamp are two.
4.In accordance with ANSI/EIA RS-481 specifications the cathode is oriented towards the tape sprocket hole.

LITEON

Chip LED Lamp

LTST-C170AKT Amber LTST-C170EKT Orange
LTST-C170GKT Green LTST-C170YKT Yellow
LTST-C170CKT GaAlAs Red

Features

- Package in 8mm tape on 7" diameter reels.
- Compatible with automatic placement equipment.
- Standard with infrared and vapor phase reflow soldering process.
- EIA STD package.

Description

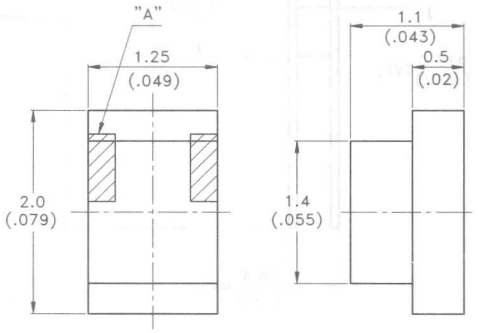
The AlGaAs Red source color are Aluminum Gallium Arsenide Red Light Emitting Diode.
The Amber source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Amber Light Emitting Diode.
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Devices

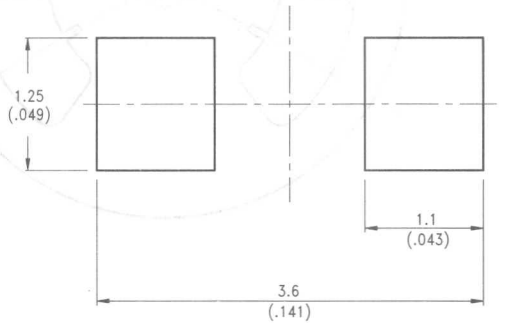
Part No. LTST.	Lens	Source Color
C170AKT	Water Clear	GaAsP on GaP Amber
C170CKT	Water Clear	AlGaAs on GaAs Red
C170EKT	Water Clear	GaAsP on GaP Orange
C170GKT	Water Clear	GaP on GaP Green
C170YKT	Water Clear	GaAsP on GaP Yellow

SMD LED PRODUCTS

Package Dimensions

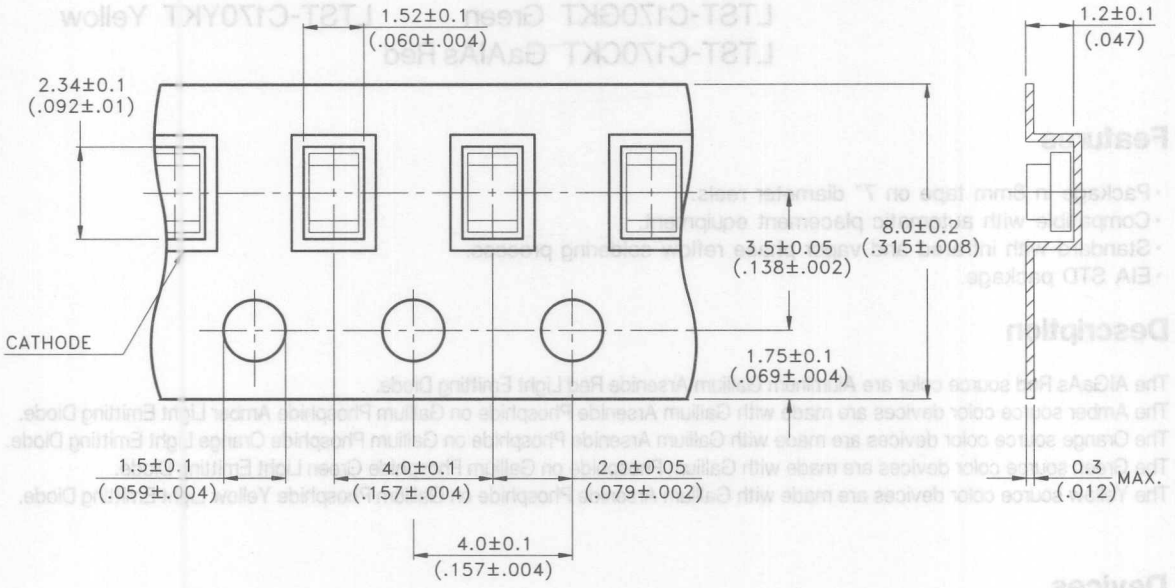


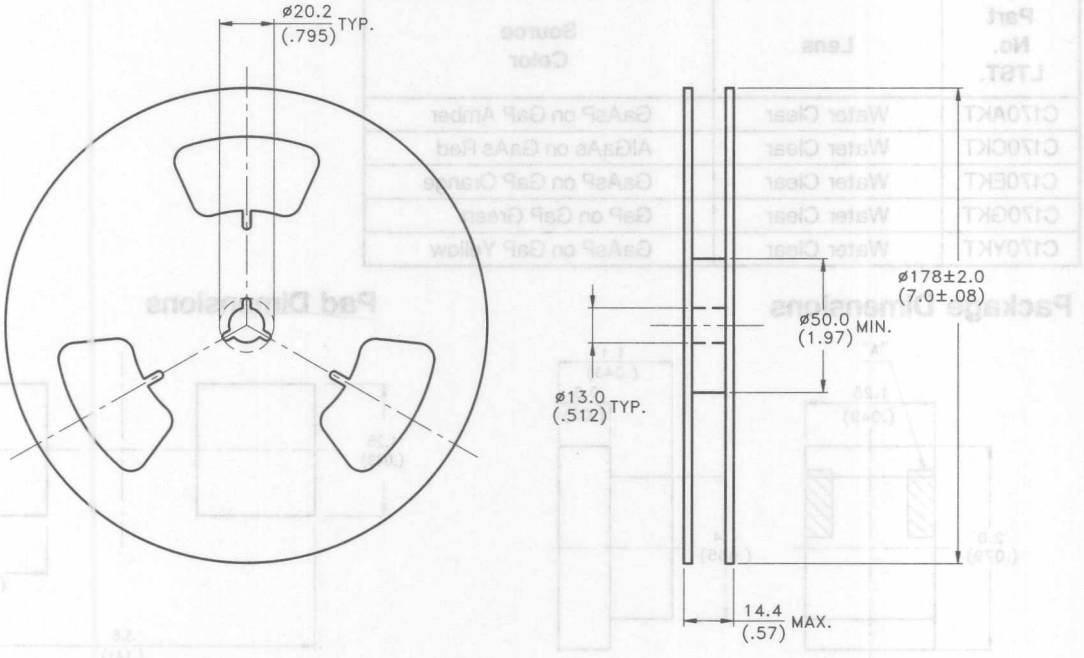
Pad Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.2mm (.008") unless otherwise noted.
3. LTL-C170CKT "A" identify anode, other item "A" identify cathode.
4. Specifications are subject to change without notice.

Package Dimensions of Tape and Reel





Notes:
1. Empty component pockets sealed with top cover tape.
2. 7 inch reel-3000 pieces per reel.
3. The maximum number of consecutive missing lamps are two.
4. In accordance with ANSI/EIA 481-1-A-1994 specifications.

Absolute Mmaximum Ratings at Ta=25 ℃

Parameter	Amber	Orange	Green	Yellow	GaAlAs Red	Unit
Power Dissipation	100	100	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	120	80	200	mA
Continuous Forward Current	30	30	30	20	40	mA
Derating Linear From 50 ℃	0.6	0.6	0.6	0.4	0.8	mA/ ℃
Reverse Voltage	5	5	5	5	4	V
Operating Temperature Range	-55 ℃ to +85 ℃					
Storage Temperature Range	-55 ℃ to +85 ℃					
Wave Soldering Condition	260 ℃ for 5 seconds					
Infared Soldering Condition	260 ℃ for 5 seconds					
Vapor Phase Soldering Condition	215 ℃ for 3 minutes					

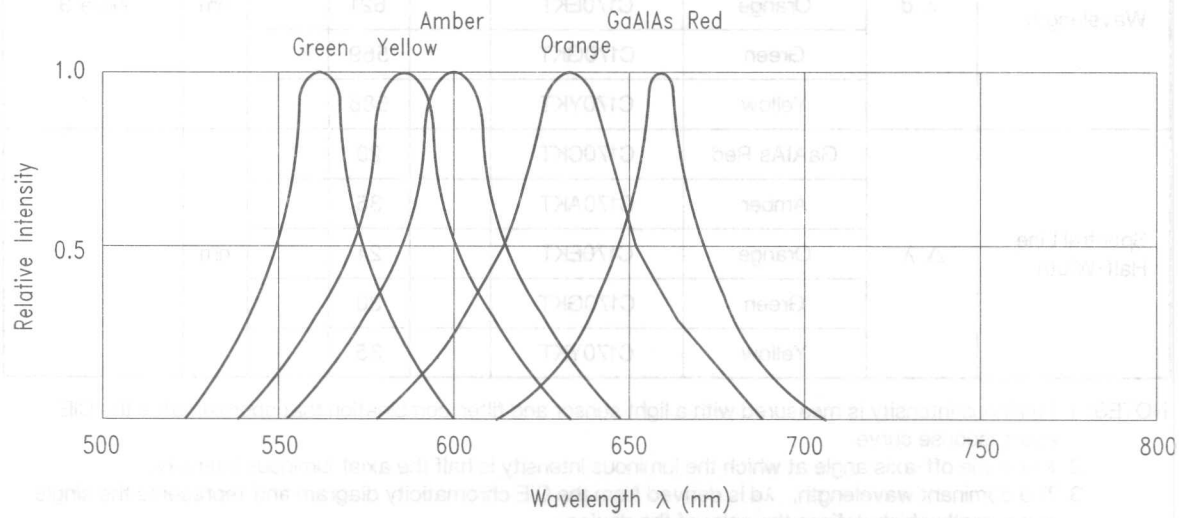


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Color	Part No. LTST.	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	GaAlAs Red	C170CKT	3.0	20.0	100.0	mcd	IF=20mA Note 1
		Amber	C170AKT	1.0	6.0	30.0	mcd	IF=10mA Note 1
		Orange	C170EKT	1.0	6.0	30.0		
		Green	C170GKT	1.0	6.0	30.0		
		Yellow	C170YKT	1.0	6.0	30.0		
Viewing Angle	2 θ 1/2	GaAlAs Red	C170CKT		130		deg	Note 2 (Fig.6)
		Amber	C170AKT		130			
		Orange	C170EKT		130			
		Green	C170GKT		130			
		Yellow	C170YKT		130			
Peak Emission Wavelength	λ P	GaAlAs Red	C170CKT		660		nm	Measurement @ peak (Fig.1)
		Amber	C170AKT		610			
		Orange	C170EKT		635			
		Green	C170GKT		565			
		Yellow	C170YKT		585			
Dominant Wavelength	λ d	GaAlAs Red	C170CKT		638		nm	Note 3
		Amber	C170AKT		602			
		Orange	C170EKT		621			
		Green	C170GKT		569			
		Yellow	C170YKT		588			
Spectral Line Half-Width	Δ λ	GaAlAs Red	C170CKT		20		nm	
		Amber	C170AKT		35			
		Orange	C170EKT		24			
		Green	C170GKT		30			
		Yellow	C170YKT		35			

NOTES: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Color	Part No. LTST.	Min.	Typ.	Max.	Unit	Test Condition
Forward Voltage	V_F	GaAlAs Red	C170CKT		1.8	2.4	V	I_F=20mA
		Amber	C170AKT		2.1	2.8		
		Orange	C170EKT		2.0	2.8		
		Green	C170GKT		2.1	2.8		
		Yellow	C170YKT		2.1	2.8		
Reverse Current	I_R	GaAlAs Red	C170CKT			100	μA	V_R=4V
		Amber	C170AKT			100		V_R=5V
		Orange	C170EKT			100		
		Green	C170GKT			100		
		Yellow	C170YKT			100		
Capacitance	C	GaAlAs Red	C170CKT		30		PF	V_F=0 f=1MHZ
		Amber	C170AKT		30			
		Orange	C170EKT		30			
		Green	C170GKT		30			
		Yellow	C170YKT		30			

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

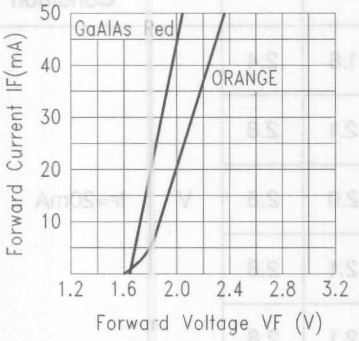


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

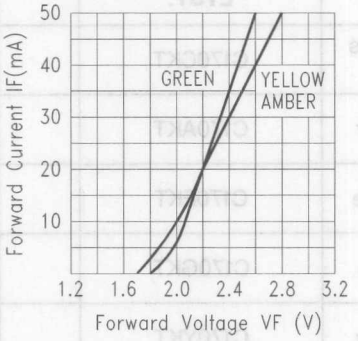


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

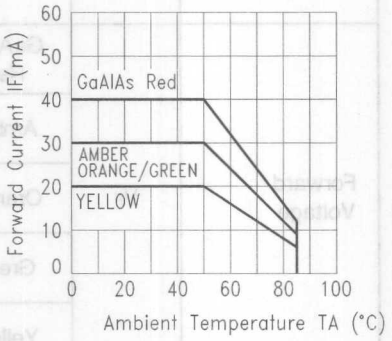


Fig.4 FORWARD CURRENT DERATING CURVE

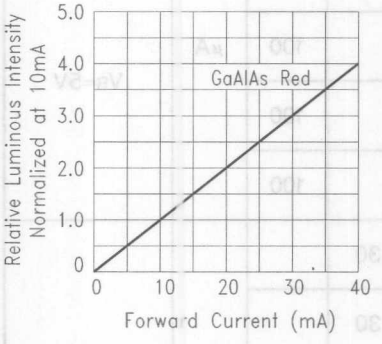


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

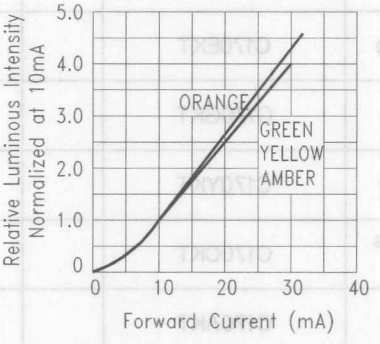


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

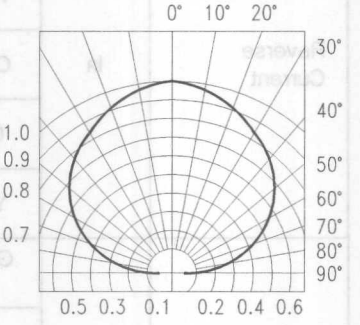


Fig.7 SPATIAL DISTRIBUTION

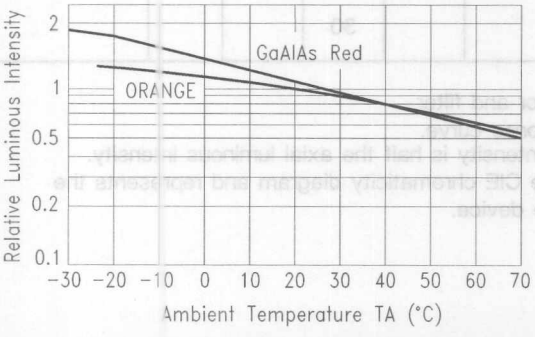


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

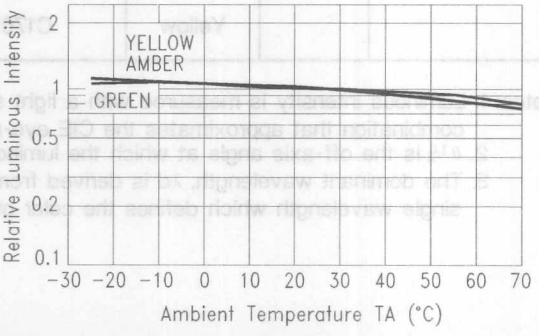


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

Chip LED Lamp

LTST- C150AKT / C190AKT	Amber
LTST- C150EKT / C190EKT	Orange
LTST- C150GKT / C190GKT	Green
LTST- C150YKT / C190YKT	Yellow
LTST- C150CKT / C190CKT	GaAlAs Red
LTST- C155GYKT	Green - Yellow
LTST- C155GEKT	Green - Orange

Features

. Package in 8mm tape on 7" diameter reels.
. Compatible with automatic placement equipment.
. Standard with infrared and vapor phase reflow soldering process.
. EIA STD package.

Description

The AlGaAs Red source color are Aluminum Gallium Arsenide Red Light Emitting Diode.
The Amber source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Amber Light Emitting Diode.
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

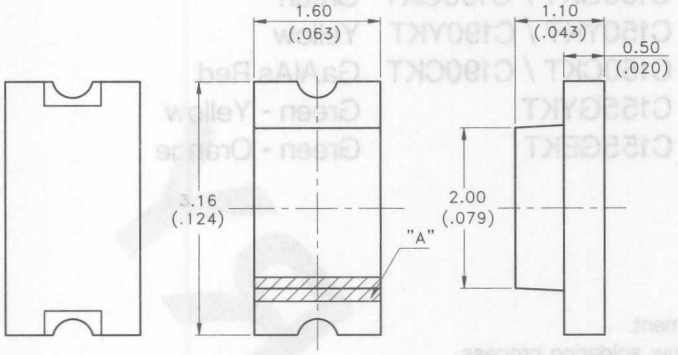
Devices

Part No. LTST-	Lens	Source Color
C150AKT C190AKT	Water Clear	GaAsP on GaP Amber
C150CKT C190CKT	Water Clear	AlGaAs on GaAs Red
C150EKT C190EKT	Water Clear	GaAsP on GaP Orange
C150GKT C190GKT	Water Clear	GaP on GaP Green
C150YKT C190YKT	Water Clear	GaAsP on GaP Yellow
C155GYKT	Water Clear	GaAsP on GaP Green-GaAsP on GaP Yellow
C155GEKT	Water Clear	GaAsP on GaP Green-GaAlAs on GaAs Red

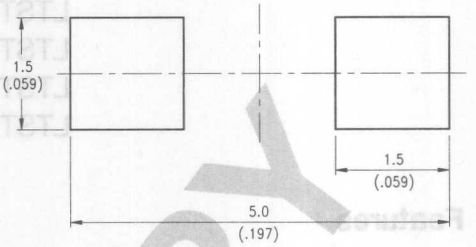
PRELIMINARY

(A) LTST-C150XKT

*Package Dimensions

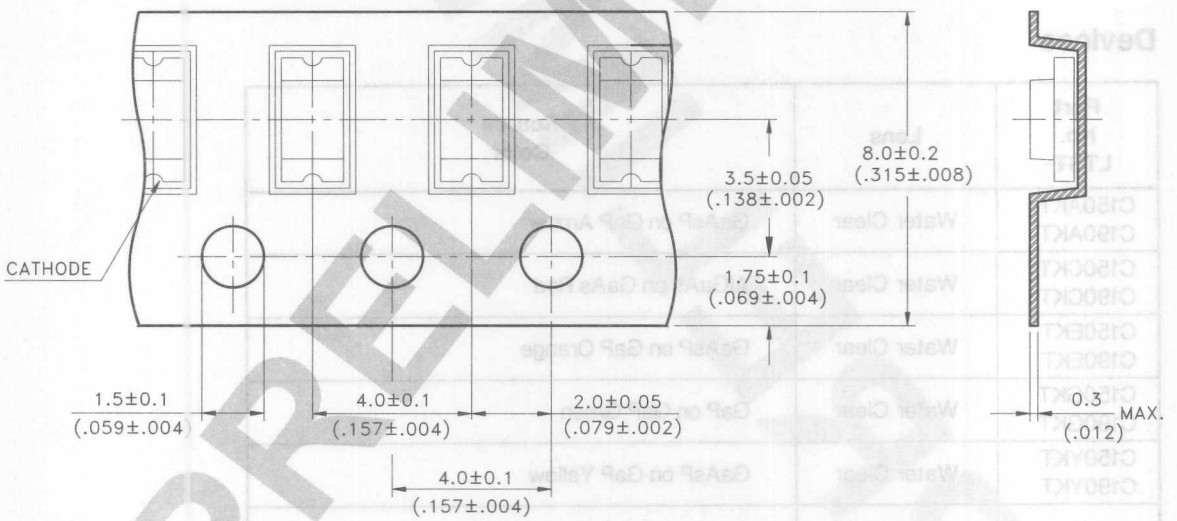


*Pad Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.2mm (.008") unless otherwise noted.
3. "A" identify cathode.
4. Specifications are subject to change without notice.

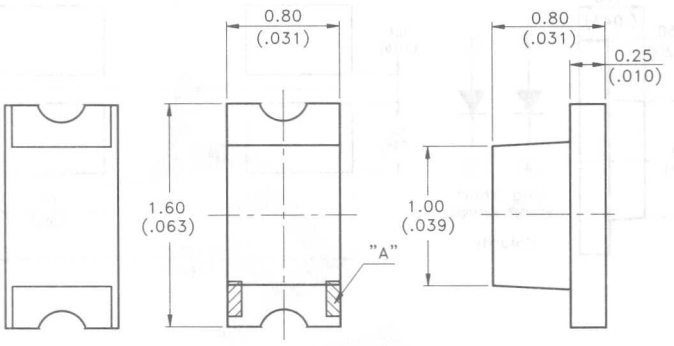
*Package Dimensions of Tape



PRELIMINARY

(B) LTST-C190XKT

*Package Dimensions

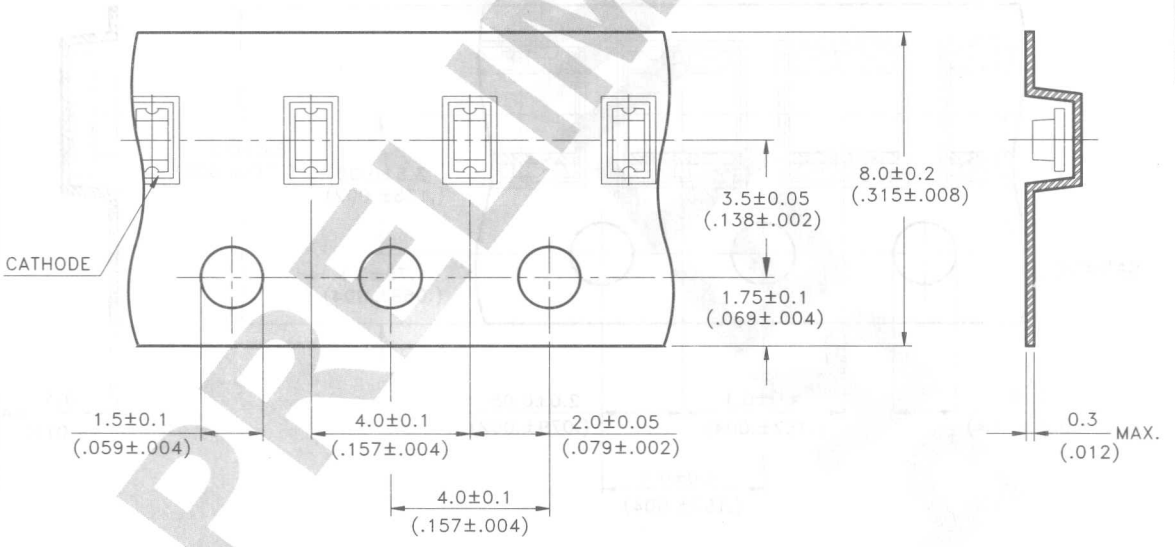


*Pad Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.2mm (.008") unless otherwise noted.
3. "A" identify cathode.
4. Specifications are subject to change without notice.

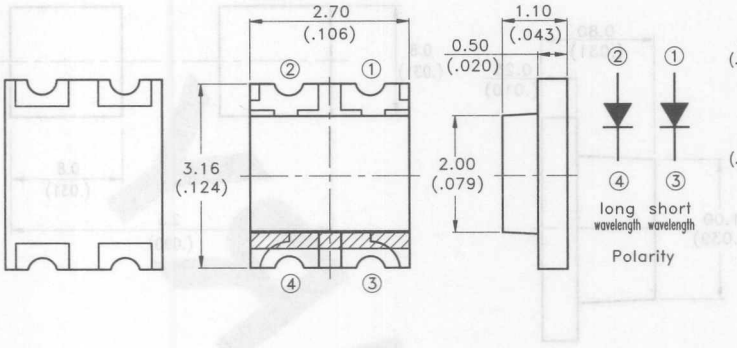
*Package Dimensions of Tape



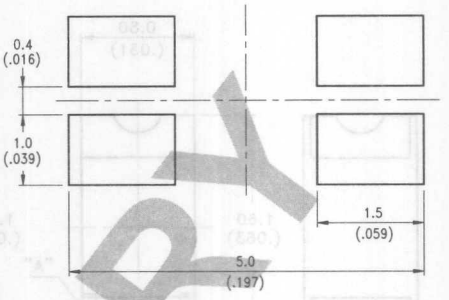
PRELIMINARY

(C) LTST-C155XKT

*Package Dimensions

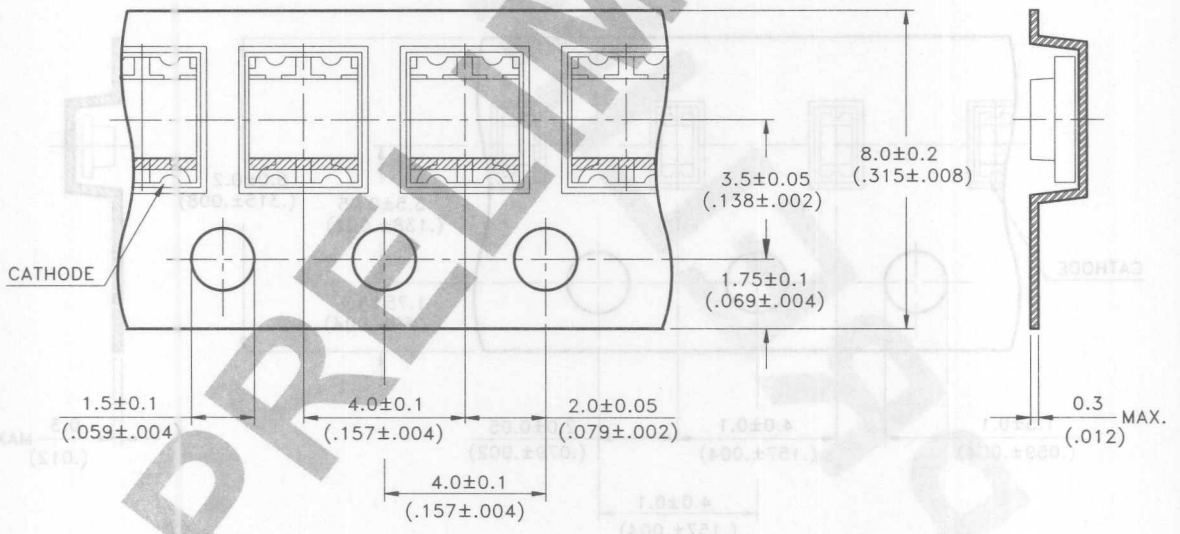


*Pad Dimensions



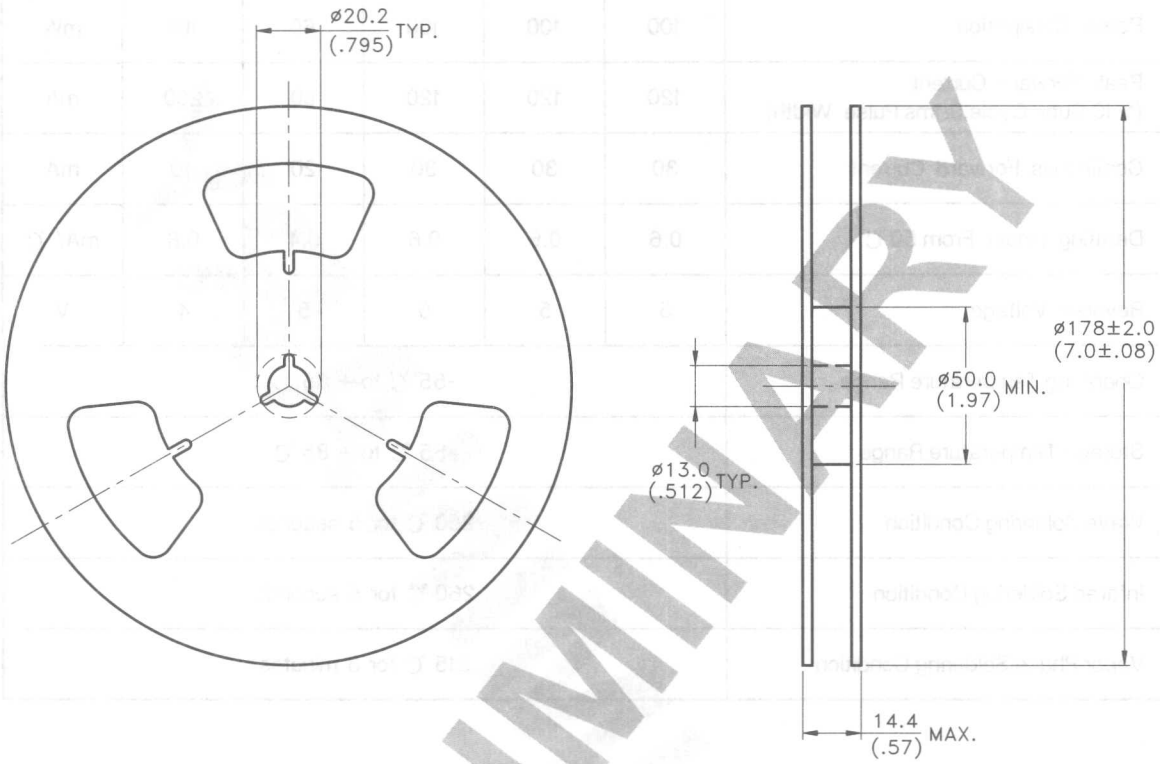
Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.2mm (.008") unless otherwise noted.
3. Specifications are subject to change without notice.

*Package Dimensions of Tape



PRELIMINARY

Package Dimensions of Reel



PRELIMINARY

Notes:
1. Empty component pockets sealed with top cover tape
2. 7 inch reel-3000 pieces per reel.
3. The maximum number of consecutive missing lamps are two.
4. In accordance with ANSI/EIA 481-1-A-1994 specifications.

Absolute Mnaximum Ratings at Ta=25 ℃

Parameter	Amber	Orange	Green	Yellow	GaAlAs Red	Unit
Power Dissipation	100	100	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle,0.1ms Pulse Width)	120	120	120	80	200	mA
Continuous Forward Current	30	30	30	20	40	mA
Derating Linear From 50 ℃	0.6	0.6	0.6	0.4	0.8	mA/ ℃
Reverse Voltage	5	5	5	5	4	V
Operating Temperature Range	-55 ℃ to + 85 ℃					
Storage Temperature Range	-55 ℃ to + 85 ℃					
Wave Soldering Condition	260 ℃ for 5 seconds					
Infared Soldering Condition	260 ℃ for 5 seconds					
Vapor Phase Soldering Condition	215 ℃ for 3 minutes					

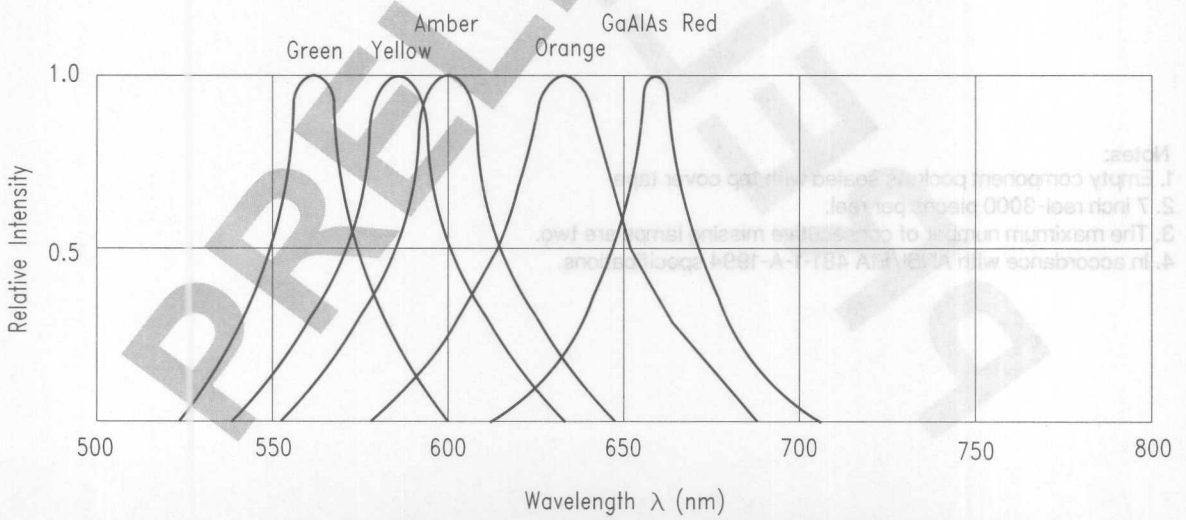


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Color	Part No. LTST-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	GaAlAs Red	C150CKT C190CKT	3.0 3.0	20.0 20.0	100.0 100.0	mcd	IF = 20mA Note 1
		Amber	C150AKT C190AKT	1.0 1.0	6.0 6.0	30.0 30.0	mcd	IF = 10mA Note 1
		Orange	C150EKT C190EKT	1.0 1.0	6.0 6.0	30.0 30.0		
		Green	C150GKT C190GKT	1.0 1.0	6.0 6.0	30.0 30.0		
		Yellow	C150YKT C190YKT	1.0 1.0	6.0 6.0	30.0 30.0		
Viewing Angle	2 θ 1/2	GaAlAs Red	C150CKT C190CKT		130 130		deg	Note 2 (Fig.6)
		Amber	C150AKT C190AKT		130 130			
		Orange	C150EKT C190EKT		130 130			
		Green	C150GKT C190GKT		130 130			
		Yellow	C150YKT C190YKT		130 130			
Peak Emission Wavelength	λ P	GaAlAs Red	C150CKT C190CKT		660 660		nm	Measurement @ peak (Fig.1)
		Amber	C150AKT C190AKT		610 610			
		Orange	C150EKT C190EKT		635 635			
		Green	C150GKT C190GKT		565 565			
		Yellow	C150YKT C190YKT		585 585			
Dominant Wavelength	λ d	GaAlAs Red	C150CKT C190CKT		638 638		nm	Note 3
		Amber	C150AKT C190AKT		602 602			
		Orange	C150EKT C190EKT		621 621			
		Green	C150GKT C190GKT		569 569			
		Yellow	C150YKT C190YKT		588 588			
Spectral Line Half-Width	Δ λ	GaAlAs Red	C150CKT C190CKT		20 20		nm	
		Amber	C150AKT C190AKT		35 35			
		Orange	C150EKT C190EKT		24 24			
		Green	C150GKT C190GKT		30 30			
		Yellow	C150YKT C190YKT		35 35			

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Color	Part No. LTST-	Min.	Typ.	Max.	Unit	Test Condition
Forward Voltage	V_F	GaAlAs Red	C150CKT C190CKT		1.8 1.8	2.4 2.4	V	I_F = 20mA
		Amber	C150AKT C190AKT		2.1 2.1	2.8 2.8		
		Orange	C150EKT C190EKT		2.0 2.0	2.8 2.8		
		Green	C150GKT C190GKT		2.1 2.1	2.8 2.8		
		Yellow	C150YKT C190YKT		2.1 2.1	2.8 2.8		
Reverse Current	I_R	GaAlAs Red	C150CKT C190CKT			100 100	μA	V_R = 4V
		Amber	C150AKT C190AKT			100 100		
		Orange	C150EKT C190EKT			100 100		V_R = 5V
		Green	C150GKT C190GKT			100 100		
		Yellow	C150YKT C190YKT			100 100		
Capacitance	C	GaAlAs Red	C150CKT C190CKT		30 30		PF	V_F = 0 f = 1 MHZ
		Amber	C150AKT C190AKT		30 30			
		Orange	C150EKT C190EKT		30 30			
		Green	C150GKT C190GKT		30 30			
		Yellow	C150YKT C190YKT		30 30			

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Color	Part No. LTST-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Green	C155GYKT C155GEKT	1.0 1.0	6.0 6.0	30.0 30.0	mcd	IF = 10mA Note 1
		Yellow	C155GYKT	1.0	6.0	30.0		
		Orange	C155GEKT	1.0	6.0	30.0		
Viewing Angle	2 θ 1/2	Green	C155GYKT C155GEKT		130 130		deg	Note 2 (FIG.6)
		Yellow	C155GYKT		130			
		Orange	C155GEKT		130			
Peak Emission Wavelength	λ P	Green	C155GYKT C155GEKT		565 565		nm	Measurement @ peak (FIG.1)
		Yellow	C155GYKT		585			
		Orange	C155GEKT		635			
Dominant Wavelength	λ d	Green	C155GYKT C155GEKT		569 569		nm	Note 3
		Yellow	C155GYKT		588			
		Orange	C155GEKT		621			
Spectral Line Half-Width	△ λ	Green	C155GYKT C155GEKT		30 30		nm	
		Yellow	C155GYKT		35			
		Orange	C155GEKT		24			
Forward Voltage	VF	Green	C155GYKT C155GEKT		2.1 2.1	2.8 2.8	V	IF = 20mA
		Yellow	C155GYKT		2.1	2.8		
		Orange	C155GEKT		2.0	2.8		
Reverse Current	IR	Green	C155GYKT C155GEKT			100 100	μA	VR = 5V
		Yellow	C155GYKT			100		
		Orange	C155GEKT			100		
Capacitance	C	Green	C155GYKT C155GEKT		30 30		PF	VF = 0 f=1MHZ
		Yellow	C155GYKT		30			
		Orange	C155GEKT		30			

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

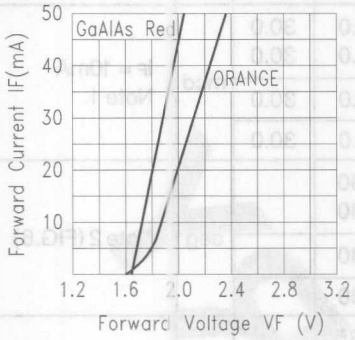


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

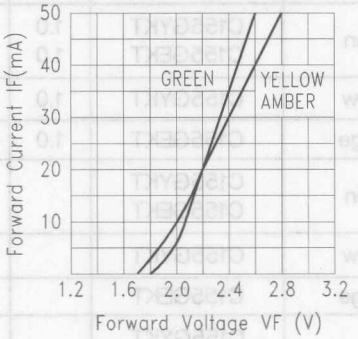


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

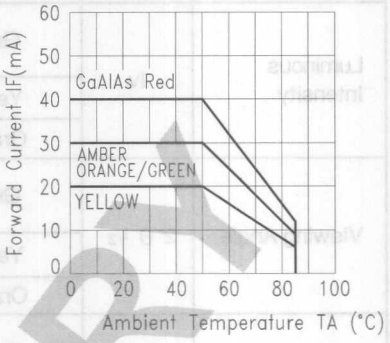


Fig.4 FORWARD CURRENT DERATING CURVE

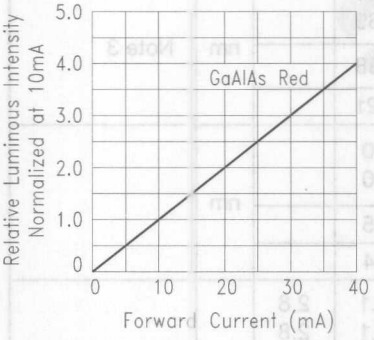


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

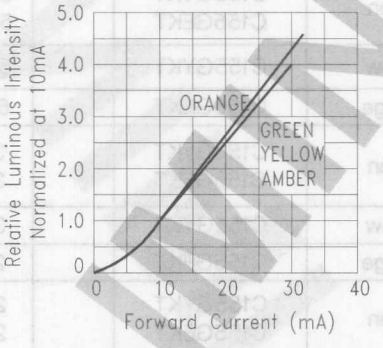


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

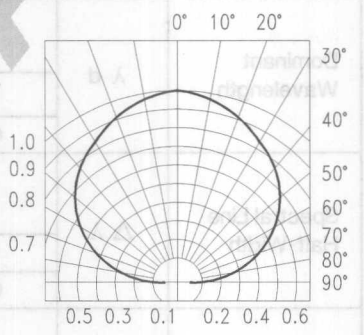


Fig.7 SPATIAL DISTRIBUTION

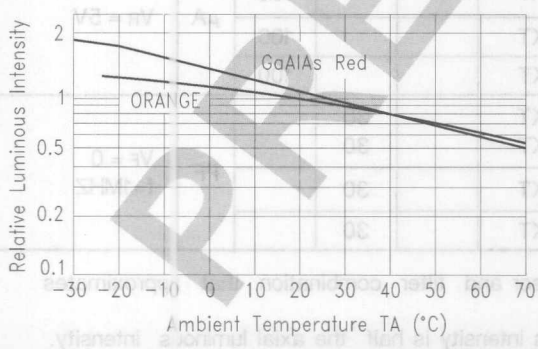


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

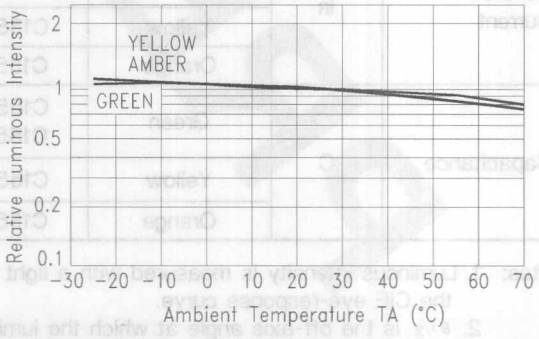


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

PRELIMINARY

LITEON

Chip LED Lamp

LTST-C230AKT Amber
LTST-C230EKT Orange
LTST-C230GKT Green
LTST-C230YKT Yellow
LTST-C230CKT GaAlAs Red

Features

- Package in 8mm tape on 7" diameter reels.
- Compatible with automatic placement equipment.
- Standard with infrared and vapor phase reflow soldering process.
- EIA STD package.

Description

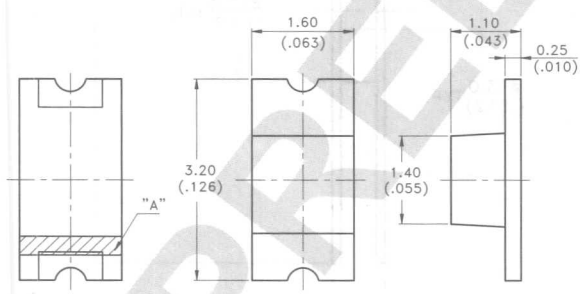
The AlGaAs Red source color are Aluminum Gallium Arsenide Red Light Emitting Diode.
The Amber source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Amber Light Emitting Diode.
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Devices

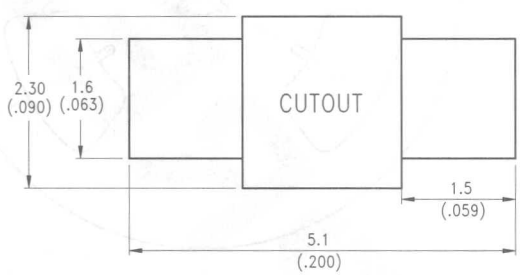
Part No. LTST-	Lens	Source Color
C230AKT	Water Clear	GaAsP on GaP Amber
C230CKT	Water Clear	AlGaAs on GaAs Red
C230EKT	Water Clear	GaAsP on GaP Orange
C230GKT	Water Clear	GaP on GaP Green
C230YKT	Water Clear	GaAsP on GaP Yellow

SMD LED PRODUCTS

Package Dimensions



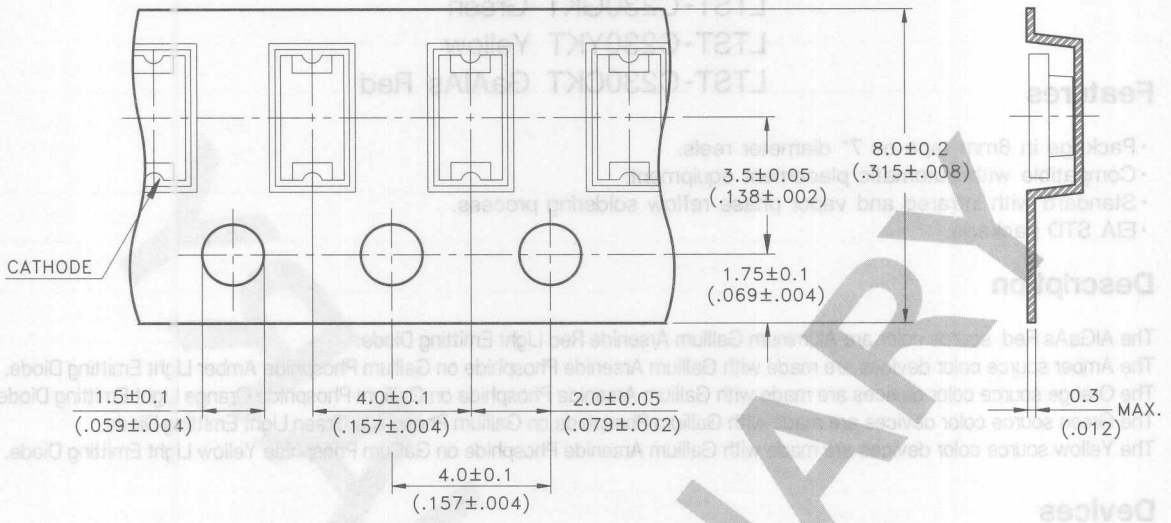
Pad Dimensions

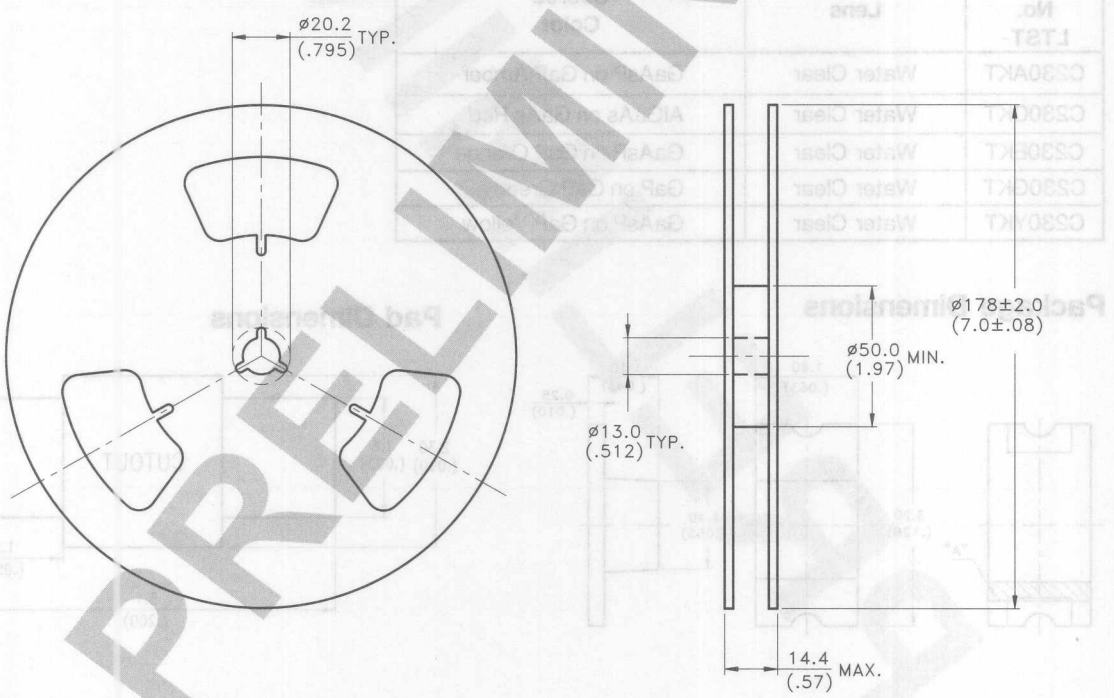


NOTES:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.2mm (.008") unless otherwise noted.
3. "A" identify cathode.
4. Specifications are subject to change without notice.

PRELIMINARY

Package Dimensions of Tape and Reel





Notes:
1. Empty component pockets sealed with top cover tape.
2. 7 inch reel-3000 pieces per reel.
3. The maximum number of consecutive missing lamps are two.
4. In accordance with ANSI/EIA 481-1-A-1994 specifications.

PRELIMINARY

Absolute Mmaximum Ratings at Ta=25 ℃

Parameter	Amber	Orange	Green	Yellow	GaAlAs Red	Unit
Power Dissipation	100	100	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle,0.1ms Pulse Width)	120	120	120	80	200	mA
Continuous Forward Current	30	30	30	20	40	mA
Derating Linear From 50 ℃	0.6	0.6	0.6	0.4	0.8	mA/ ℃
Reverse Voltage	5	5	5	5	4	V
Operating Temperature Range	-55 ℃ to + 85 ℃					
Storage Temperature Range	-55 ℃ to + 85 ℃					
Wave Soldering Condition	260 ℃ for 5 seconds					
Infared Soldering Condition	260 ℃ for 5 seconds					
Vapor Phase Soldering Condition	215 ℃ for 3 minutes					

PRELIMINARY

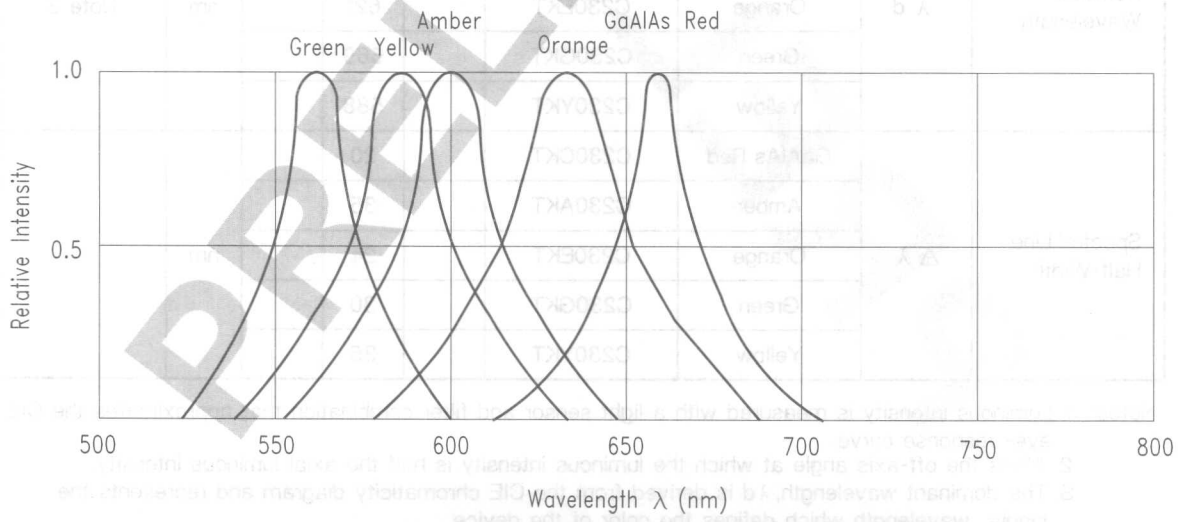


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Color	Part No. LTST-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	GaAlAs Red	C230CKT	3.0	20.0	100.0	mcd	IF = 20mA Note 1
		Amber	C230AKT	1.0	6.0	30.0	mcd	IF = 10mA Note 1
		Orange	C230EKT	1.0	6.0	30.0		
		Green	C230GKT	1.0	6.0	30.0		
		Yellow	C230YKT	1.0	6.0	30.0		
Viewing Angle	2 θ 1/2	GaAlAs Red	C230CKT		130		deg	Note 2 (Fig.6)
		Amber	C230AKT		130			
		Orange	C230EKT		130			
		Green	C230GKT		130			
		Yellow	C230YKT		130			
Peak Emission Wavelength	λ P	GaAlAs Red	C230CKT		660		nm	Measurement @ peak (Fig.1)
		Amber	C230AKT		610			
		Orange	C230EKT		635			
		Green	C230GKT		565			
		Yellow	C230YKT		585			
Dominant Wavelength	λ d	GaAlAs Red	C230CKT		638		nm	Note 3
		Amber	C230AKT		602			
		Orange	C230EKT		621			
		Green	C230GKT		569			
		Yellow	C230YKT		588			
Spectral Line Half-Width	△ λ	GaAlAs Red	C230CKT		20		nm	
		Amber	C230AKT		35			
		Orange	C230EKT		24			
		Green	C230GKT		30			
		Yellow	C230YKT		35			

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye- response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Color	Part No. LTST-	Min.	Typ.	Max.	Unit	Test Condition
Forward Voltage	V_F	GaAlAs Red	C230CKT		1.8	2.4	V	I_F = 20mA
		Amber	C230AKT		2.1	2.8		
		Orange	C230EKT		2.0	2.8		
		Green	C230GKT		2.1	2.8		
		Yellow	C230YKT		2.1	2.8		
Reverse Current	I_R	GaAlAs Red	C230CKT			100	μA	V_R = 4V
		Amber	C230AKT			100		V_R = 5V
		Orange	C230EKT			100		
		Green	C230GKT			100		
		Yellow	C230YKT			100		
Capacitance	C	GaAlAs Red	C230CKT		30		PF	V_F = 0 f = 1 MHZ
		Amber	C230AKT		30			
		Orange	C230EKT		30			
		Green	C230GKT		30			
		Yellow	C230YKT		30			

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

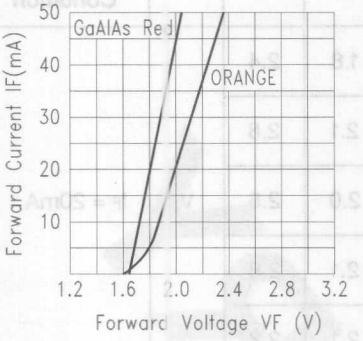


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

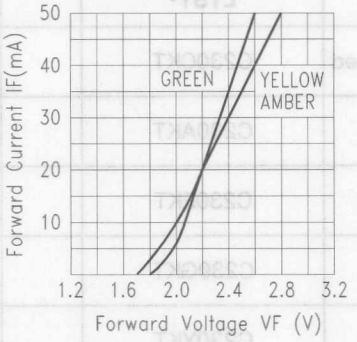


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

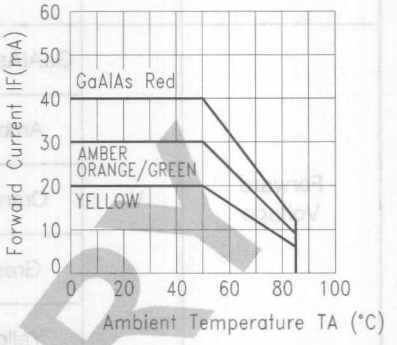


Fig.4 FORWARD CURRENT DERATING CURVE

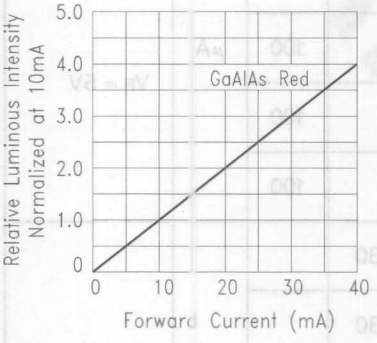


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

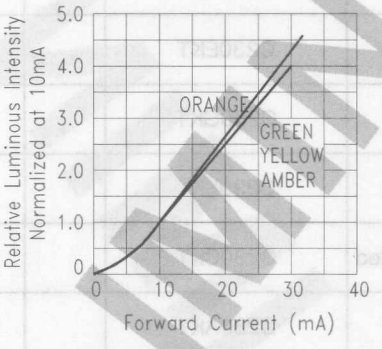


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

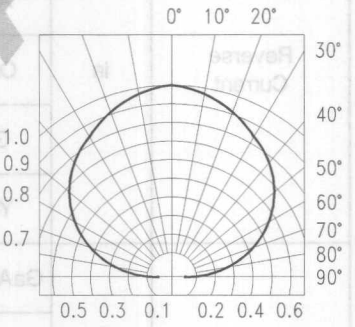


Fig.7 SPATIAL DISTRIBUTION

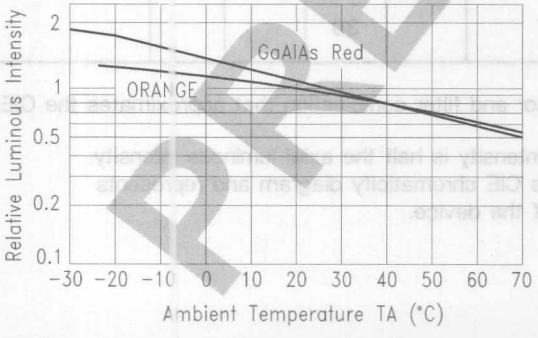


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

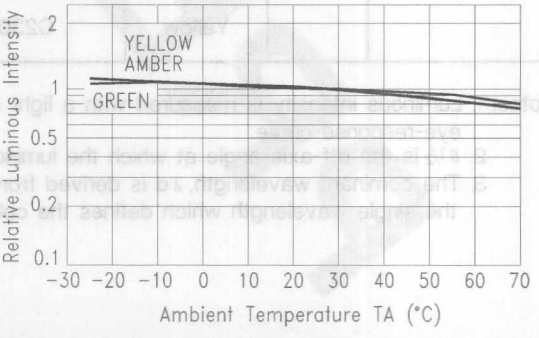


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

PRELIMINARY

SMD LED PRODUCTS

7. ULTRA BRIGHT LAMPS, CLUSTER & CHMSL

- SELECTION GUIDE 7-1
- CROSS REFERENCE GUIDE 7-8
- ULTRA BRIGHT LED LAMPS 7-10
- LED CLUSTER LAMPS 7-90
- CHMSL 7-95

Selection Guide

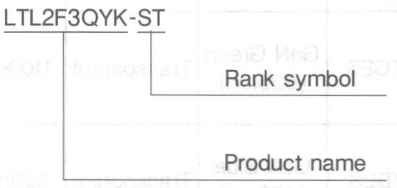
· Luminous Intensity Classification Table

Rank	Luminous Intensity (mcd)	Rank	Luminous Intensity (mcd)
A	0.1~0.2	N	100~200
B	0.18~0.36	P	180~360
C	0.32~0.64	Q	320~640
D	0.56~1.12	R	560~1,120
E	1.0~2.0	S	1,000~2,000
F	1.8~3.6	T	1,800~3,600
G	3.2~6.4	U	3,200~6,400
H	5.6~11.2	V	5,600~11,200
J	10~20	W	10,000~20,000
K	18~36	X	18,000~36,000
L	32~64	Y	32,000~64,000
M	56~112		

Note:
The table is applicable to ultra bright lamps as common criteria for luminous intensity classification. Regarding the guaranteed values of luminous intensity specifications, please note that the upper and lower limit values of the classification criteria include ± 15% tolerances.

Type Designation

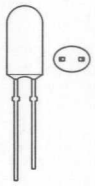
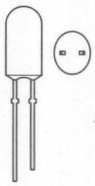
Example:



Rank classified products support two rank as standard features.

Selection Guide

· Ultra Bright GaN LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ ½ *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ d)	Lens				
	T-1 ¾ Flangeless 1"Lead 5 φ	LTL051TGKS	GaN Green (525nm)	Water Clear	4300mcd	15 °	3.5V	7-10
		LTL051TBKS	GaN Blue (470nm)	Water Clear	1500mcd	15 °	3.5V	
	T-1 ¾ Standard 1"Lead 5 φ	LTL053TGKS	GaN Green (525nm)	Water Clear	1900mcd	30 °	3.5V	7-14
		LTL053TBKS	GaN Blue (470nm)	Water Clear	650mcd	30 °	3.5V	
	T-1 ¾ Medium Profile 1"Lead 5 φ	LTL055TGKS	GaN Green (525nm)	Water Clear	1100mcd	45 °	3.5V	7-18
		TLT055TBKS	GaN Blue (470nm)	Water Clear	370mcd	45 °	3.5V	
	Oval 4 φ	LTL04ETGKS	GaN Green (525nm)	Water Clear	600mcd	80 °/35 °	3.5V	7-22
		LTL04ETBKS	GaN Blue (470nm)	Water Clear	210mcd	80 °/35 °	3.5V	
	Oval 5 φ	LTL05ETGES	GaN Green (525nm)	Transparent	1100mcd	70 °/25 °	3.5V	7-26
		LTL05ETBES	GaN Blue (470nm)	Transparent	390mcd	70 °/25 °	3.5V	

PRELIMINARY

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Ultra Bright AlInGaP V-series LED Lamps (Available for outdoor application)

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ d)	Lens				
	T-1 3/4 Standard 1"Lead 5 ϕ	LTL2F3VEK	AlInGaP Orange (623nm)	Water Clear	4800mcd	8 °	2.2V	7-30
		LTL2H3VEK			2600mcd	15 °	2.2V	
		LTL2P3VEK			1800mcd	22 °	2.2V	
		LTL2R3VEK			1200mcd	30 °	2.2V	
		LTL2F3VAK	AlInGaP Amber (612nm)	Water Clear	7000mcd	8 °	2.2V	7-34
		LTL2H3VAK			3600mcd	15 °	2.2V	
		LTL2P3VAK			2300mcd	22 °	2.2V	
		LTL2R3VAK			1500mcd	30 °	2.2V	
		LTL2F3VYK	AlInGaP Yellow (592nm)	Water Clear	7000mcd	8 °	2.2V	7-38
		LTL2H3VYK			3600mcd	15 °	2.2V	
		LTL2P3VYK			2300mcd	22 °	2.2V	
		LTL2R3VYK			1500mcd	30 °	2.2V	

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Dominant Emission wavelength (nm).

PRELIMINARY

Selection Guide

· Ultra Bright AS AlInGaP Q-series LED Lamps (Available for half-outdoor and outdoor application)

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ d)	Lens				
	T-1 3/4 Standard 1"Lead 5 ϕ	LTL2F3QRK	AlInGaP Red (632nm)	Water Clear	2600mcd	8 °	1.9V	7-42
		LTL2H3QRK			1500mcd	15 °	1.9V	
		LTL2P3QRK			1000mcd	22 °	1.9V	
		LTL2R3QRK			600mcd	30 °	1.9V	
		LTL2F3QAK	AlInGaP Amber (612nm)	Water Clear	3600mcd	8 °	2.0V	7-46
		LTL2H3QAK			2000mcd	15 °	2.0V	
		LTL2P3QAK			1400mcd	22 °	2.0V	
		LTL2R3QAK			900mcd	30 °	2.0V	
		LTL2F3QFK	AlInGaP Light Amber (605nm)	Water Clear	3600mcd	8 °	2.0V	7-50
		LTL2H3QFK			2000mcd	15 °	2.0V	
		LTL2P3QFK			1400mcd	22 °	2.0V	
		LTL2R3QFK			900mcd	30 °	2.0V	
		LTL2F3QYK	AlInGaP Yellow (592nm)	Water Clear	3600mcd	8 °	2.0V	7-54
		LTL2H3QYK			2000mcd	15 °	2.0V	
		LTL2P3QYK			1400mcd	22 °	2.0V	
		LTL2R3QYK			900mcd	30 °	2.0V	
		LTL2F3QSK	AlInGaP Light Yellow (587nm)	Water Clear	3600mcd	8 °	2.0V	7-58
		LTL2H3QSK			2000mcd	15 °	2.0V	
		LTL2P3QSK			1400mcd	22 °	2.0V	
		LTL2R3QSK			900mcd	30 °	2.0V	

PRELIMINARY

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Ultra Bright AS AlInGaP K-series LED Lamps (Available for indoor application)

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ ½ *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	T-1 ¾ Standard 1"Lead 5 φ	LTL2F3KRK	AlInGaP Red (632nm)	Water Clear	2300mcd	8 °	2.0V	7-62
		LTL2H3KRK			1400mcd	15 °	2.0V	
		LTL2P3KRK			900mcd	22 °	2.0V	
		LTL2R3KRK			500mcd	30 °	2.0V	
		LTL2F3KAK	AlInGaP Amber (612nm)	Water Clear	3000mcd	8 °	2.1V	7-66
		LTL2H3KAK			1700mcd	15 °	2.1V	
		LTL2P3KAK			1200mcd	22 °	2.1V	
		LTL2R3KAK			700mcd	30 °	2.1V	
		LTL2F3KYK	AlInGaP Yellow (592nm)	Water Clear	3000mcd	8 °	2.1V	7-70
		LTL2H3KYK			1700mcd	15 °	2.1V	
		LTL2P3KYK			1200mcd	22 °	2.1V	
		LTL2R3KYK			700mcd	30 °	2.1V	

Notes:

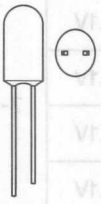
* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Dominant Emission wavelength (nm).

PRELIMINARY

Selection Guide

· Ultra Bright High Performance AlGaAs LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	T-1 3/4 Standard 1"Lead 5 φ	LTL2E3URK	AlGaAs Red (660nm)	Water Clear	3000mcd	8 °	1.8V	7-74
		LTL2K3URK			1500mcd	20 °	1.8V	
		LTL2M3URK			1000mcd	30 °	1.8V	
		LTL2N3URK			600mcd	40 °	1.8V	
	Oval 5 φ	LTL2D3URK	AlGaAs Red (660nm)	Water Clear	300mcd	70 °/35 °	1.8V	7-78
	T-1 3/4 Modified 1"Lead 5 φ	LTL-353URKR	AlGaAs Red (660nm)	Water Clear	2300mcd	12 °	1.8V	7-82
		LTL-353CKR-H4	DH AlGaAs Red (660nm)	Water Clear	1000mcd	12 °	1.8V	
		LTL-353CKR-H3	DH AlGaAs Red (660nm)	Water Clear	700mcd	12 °	1.8V	
		LTL-353CKR-L2	DH AlGaAs Red (660nm)	Water Clear	300mcd	12 °	1.8V	
	T-1 3/4 Standard 1"Lead 3 φ	LTL-4266NUR	AlGaAs Red (660nm)	Water Clear	500mcd	35 °	1.8V	7-86
		LTL-4266NR	DH AlGaAs Red (660nm)	Water Clear	170mcd	45 °	1.8V	
		LTL-4262NR	DH AlGaAs Red (660nm)	Transparent	135mcd	45 °	1.8V	
		LTL-4261NR	DH AlGaAs Red (660nm)	Diffused	60mcd	60 °	1.8V	

PRELIMINARY

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

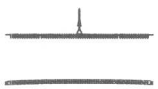
** Peak Emission wavelength (nm).

Selection Guide

· LED CLUSTER LAMPS

Outline	Device		Description		Luminous Intensity Iv Typ.	Viewing Angle 2 θ 1/2 Typ.	Supply Current	Page No.
	Package	Part No.	Color(λ P)	LED Number				
	φ 50	LTM-9062-1	Red(660nm) Green(565nm)	16 35	9.0cd 5.5cd	36 ° 36 °	40mA 100mA	7-90
	φ 30	LTM-9266-1	Red(660nm) Green(565nm)	5 10	4.0cd 1.6cd	36 ° 36 °	20mA 40mA	7-92

· CHMSL (Central High Mount Stop Lamps)

Outline	Device		Description		Luminous Intensity Iv Typ.	Supply Voltage	Page No.
	Package	Part No.	Color(λ P)	LED Number			
	598mmL	LTM-9466	RED(660nm)	84	25cd	12V	7-95

Cross Reference Guide for:

H.P. / TOSHIBA LED Lamps

In order to designate the similarity between the other manufactures' device and the nearest LITON equivalent. This guide has been included a letter code system to cover it.

Code Definitions:

A — LITON device is electrical and mechanical equivalent.
B — Minor electrical differences exist.
C — Minor mechanical differences exist.
D — Significant electrical differences exist.
E — Significant mechanical differences exist.

Since optoelectronics is a relatively young industry, it is possible that different devices offered by two or more manufacturers will satisfy the requirements of one application. Therefore slight mechanical or electrical differences should not disqualify the nearest equivalent.

The data contained in the guide is believed to be accurate. However, no responsibility is assumed by TAIWAN LITON ELECTRONIC CO., LTD. for the use of this data in actual circuit design.

Cross Reference Guide

Equivalent LED Lamps

H.P. Part No.	LITON Part No.	Code
HLMA-CH00	LTL2F3QAK	B
HLMA-CH15	LTL2H3QAK	D
HLMA-CJ15	LTL2H3QFK	D
HLMA-CL00	LTL2F3QYK	B
HLMA-CL15	LTL2H3QYK	B
HLMA-DH00	LTL2P3QAK	D
HLMA-DL00	LTL2P3QYK	B
HLMT-CD17	LTL2H3VRK	B
HLMT-CH00	LTL2F3VAK	B
HLMT-CH17	LTL2H3VAK	B
HLMT-CL00	LTL2F3VYK	B
HLMT-CL17	LTL2H3VYK	B
HLMT-DD32	LTL2R3VRK	B
HLMT-DH00	LTL2P3VAK	B
HLMT-DH32	LTL2R3VAK	B
HLMT-DL00	LTL2P3VYK	B
HLMT-DL32	LTL2R3VYK	B
HLMP-8103	LTL2E3URK	B
HLMP-8100	LTL2K3URK	B
HLMP-C100	LTL2M3URK	B
HLMP-C110	LTL2N3URK	B

Equivalent LED Lamps

TOSHIBA Part No.	LITON Part No.	Code
TLOE156P	LTL2R3QFK	B
TLOE157P	LTL2P3QFK	B
TLOE180P	LTL2F3QFK	B
TLRE156P	LTL2R3QRK	B
TLRE157P	LTL2P3QRK	B
TLRE180P	LTL2F3QRK	B
TLRH156P	LTL2R3VRK	B
TLRH157P	LTL2P3VRK	B
TLRH180P	LTL2F3VRK	B
TLSH156P	LTL2R3VAK	B
TLSH157P	LTL2P3VAK	B
TLSH180P	LTL2F3VAK	B
TLYE156P	LTL2R3QYK	B
TLYE157P	LTL2P3QYK	B
TLYE180P	LTL2F3QYK	B
TLYH156P	LTL2R3VYK	B
TLYH157P	LTL2P3VYK	B
TLYH180P	LTL2F3VYK	B
TLYU156P	LTL2R3KYK	B
TLYU180P	LTL2F3KYK	B
TLRA180AP	LTL2E3URK	B
TLRA120	LTL2M3URK	B

LITEON

T-1¾ (5mm) Flangeless Ultra Brigh GaN LED Lamps

LTL051TGKS GaN Green
LTL051TBKS GaN Blue

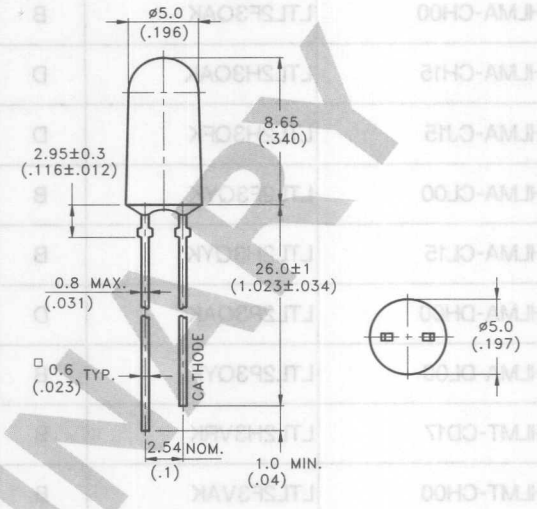
Features

- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

The source color devices are made with Gallium Nitride light emitting diode.
The devices are made with water clear epoxy package, and with 8 degress of viewing angle.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
051TGKS	Water Clear	Non-diffused	GaN Green
051TBKS	Water Clear	Non-diffused	GaN Blue

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Blue	Unit
Power Dissipation	120	120	mV
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	100	100	mA
Continuous Forward Current	30	30	mA
Reverse Voltage	5	5	V
Operating Temperature Range	-25 ℃ to + 80 ℃		
Storage Temperature Range	-30 ℃ to + 100 ℃		
Lead Soldering Temperature [2.0mm(0.079 in)From Body]	260 ℃ for 5 Seconds		

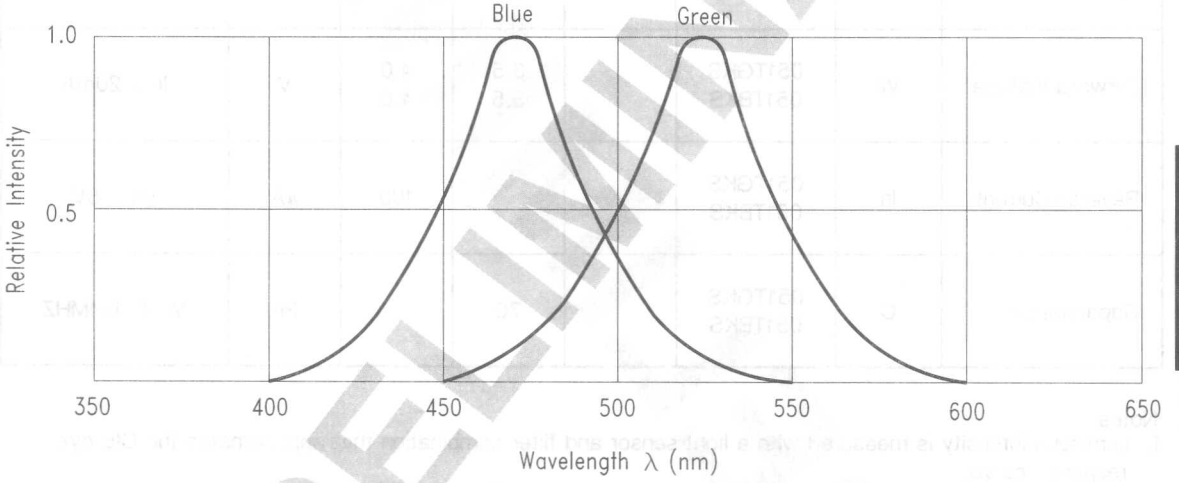


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical / Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	051TGKS 051TBKS	2800 960	4300 1500		mcd	IF=20mA Note 1
Viewing Angle	2 θ 1/2	051TGKS 051TBKS		15		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	051TGKS 051TBKS		522 470		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd	051TGKS 051TBKS	520 465		530 475	nm	Note 5
Spectral Line Half-Width	△λ	051TGKS 051TBKS		45 35		nm	
Forward Voltage	VF	051TGKS 051TBKS		3.5 3.5	4.0 4.0	V	IF = 20mA
Reverse Current	IR	051TGKS 051TBKS			100	μA	VR = 5V
Capacitance	C	051TGKS 051TBKS		70		PF	VF=0, f=1MHZ

Notes:

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. Iv classification code is marked on each packing bag.
4. The Iv guarantee should be added ± 15%.
5. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.
6. Precautions in handling:
   - When soldering, leave 2mm of minimum clearance from the resin to the soldering point.
   - Dipping the resin to solder must be avoided.
   - Correcting the soldered position after soldering must be avoided.
   - In soldering, do not apply any stress to the lead frame particularly when heated.
   - Lead forming must be done before soldering.
   - It is necessary to cut the lead frame at normal temperature.
7. Caution in ESD
   - Static Electricity and surge damages the LED. It is recommend to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

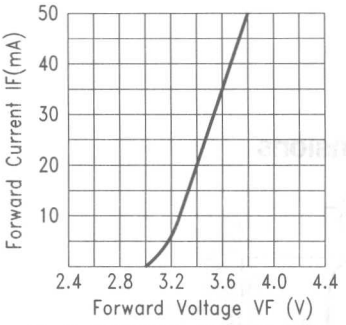


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

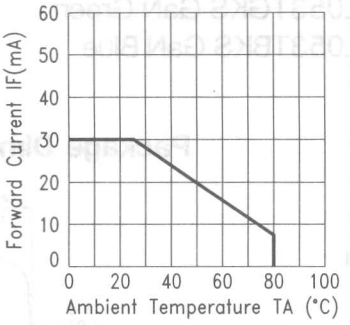


Fig.3 FORWARD CURRENT DERATING CURVE

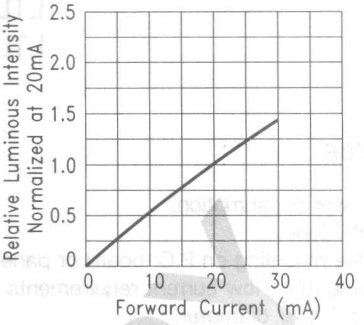


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

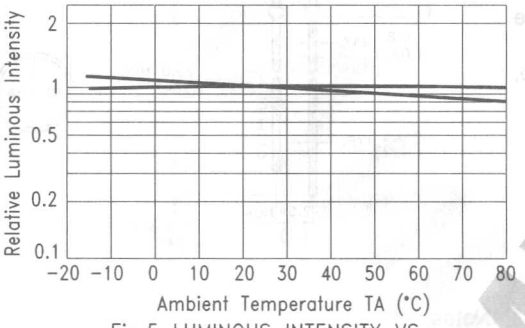


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

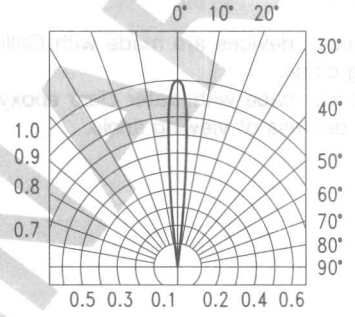


Fig.6 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright GaN LED Lamps

LTL053TGKS GaN Green
LTL053TBKS GaN Blue

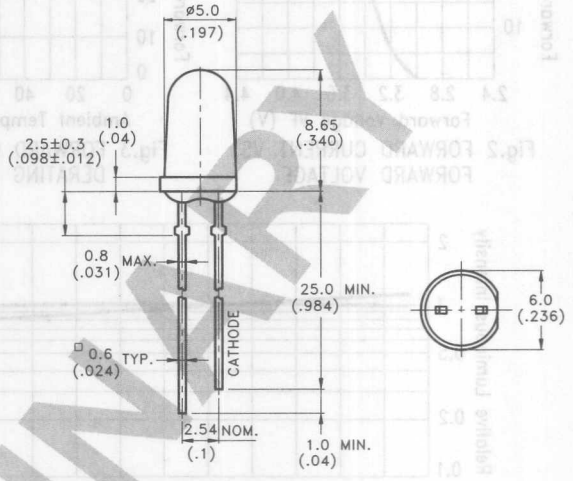
Features

- Low power consumption.
- High efficiency
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

The source color devices are made with Gallium Nitride light emitting diode.
The devices are made with water clear epoxy package, and with 20 degress of viewing angle.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
053TGKS	Water Clear	Non-diffused	GaN Green
053TBKS	Water Clear	Non-diffused	GaN Blue

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Blue	Unit
Power Dissipation	120	120	mV
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	100	100	mA
Continuous Forward Current	30	30	mA
Reverse Voltage	5	5	V
Operating Temperature Range	-25 ℃ to + 80 ℃		
Storage Temperature Range	-30 ℃ to + 100 ℃		
Lead Soldering Temperature [2.0mm(0.079 in)From Body]	260 ℃ for 5 Seconds		

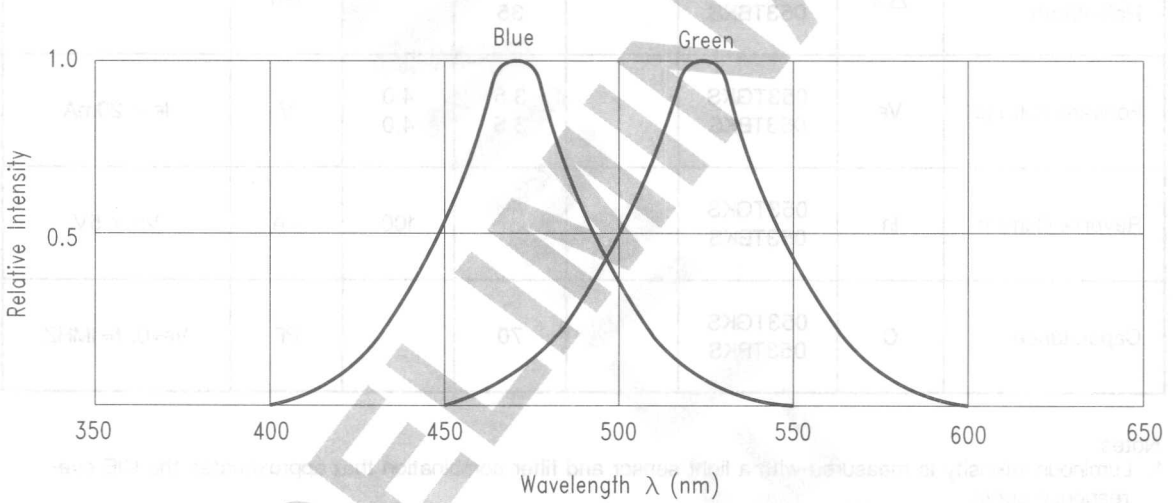


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical / Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	053TGKS 053TBKS	1100 390	1900 650		mcd	IF=20mA Note 1
Viewing Angle	2 θ ½	053TGKS 053TBKS		30		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	053TGKS 053TBKS		522 470		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd	053TGKS 053TBKS	520 465		530 475	nm	Note 5
Spectral Line Half-Width	△λ	053TGKS 053TBKS		45 35		nm	
Forward Voltage	VF	053TGKS 053TBKS		3.5 3.5	4.0 4.0	V	IF = 20mA
Reverse Current	IR	053TGKS 053TBKS			100	μA	VR = 5V
Capacitance	C	053TGKS 053TBKS		70		PF	VF=0, f=1MHZ

Notes:

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. Iv classification code is marked on each packing bag.
4. The Iv guarantee should be added ±15%.
5. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.
6. Precautions in handling:
   - When soldering, leave 2mm of minimum clearance from the resin to the soldering point.
   - Dipping the resin to solder must be avoided.
   - Correcting the soldered position after soldering must be avoided.
   - In soldering, do not apply any stress to the lead frame particularly when heated.
   - Lead forming must be done before soldering.
   - It is necessary to cut the lead frame at normal temperature.
7. Caution in ESD:
   - Static Electricity and surge damages the LED. It is recommend to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

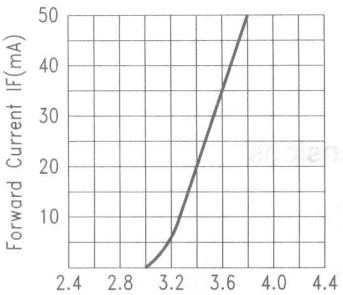


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

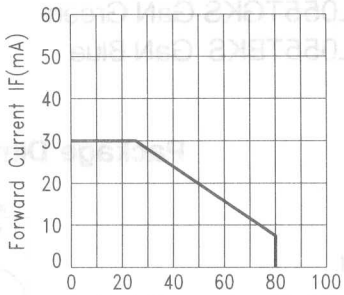


Fig.3 FORWARD CURRENT DERATING CURVE

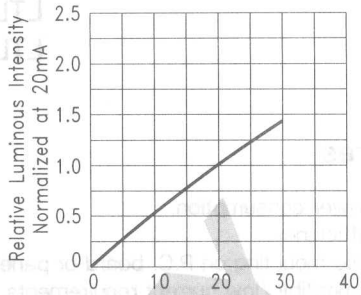


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

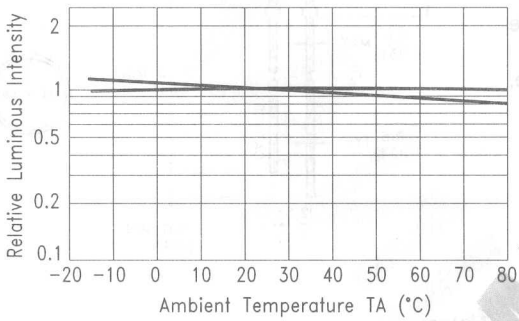


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

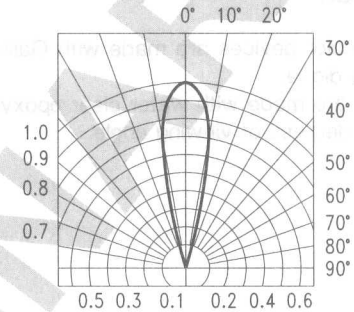


Fig.6 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Medium Profile Ultra Bright GaN LED Lamps

LTL055TGKS GaN Green
LTL055TBKS GaN Blue

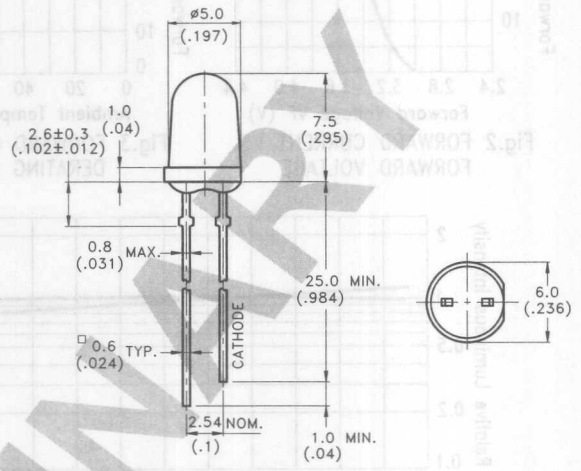
Features

- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

The source color devices are made with Gallium Nitride light emitting diode.
The devices are made with water clear epoxy package, and with 40 degress of viewing angle.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
055TGKS	Water Clear	Non-diffused	GaN Green
055TBKS	Water Clear	Non-diffused	GaN Blue

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Blue	Unit
Power Dissipation	120	120	mV
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	100	100	mA
Continuous Forward Current	30	30	mA
Reverse Voltage	5	5	V
Operating Temperature Range	-25 ℃ to + 80 ℃		
Storage Temperature Range	-30 ℃ to + 100 ℃		
Lead Soldering Temperature [2.0mm(0.079 in)From Body]	260 ℃ for 5 Seconds		

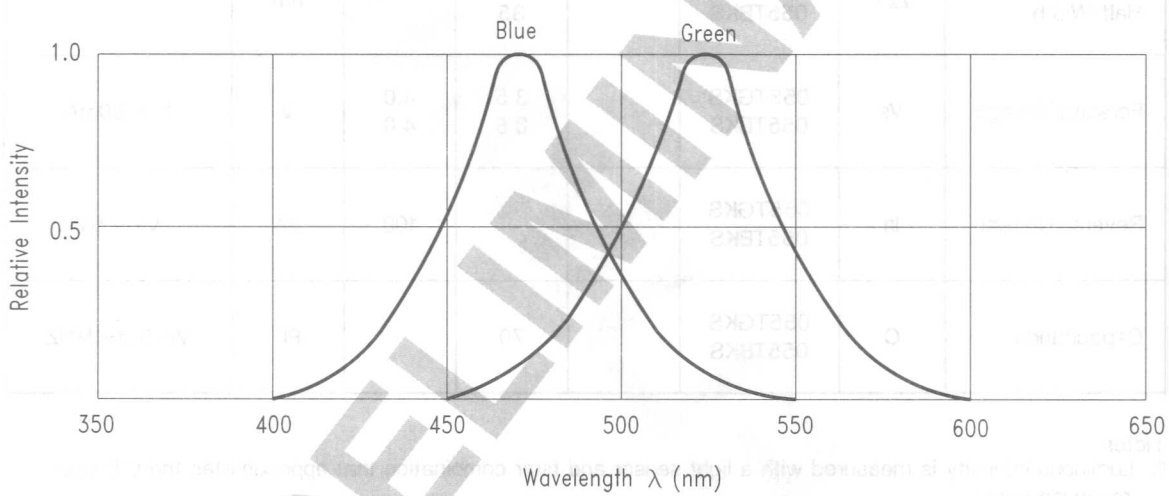


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	055TGKS 055TBKS	600 210	1100 370		mcd	IF=20mA Note 1
Viewing Angle	2 θ ½	055TGKS 055TBKS		45		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	055TGKS 055TBKS		522 470		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd	055TGKS 055TBKS	520 465		530 475	nm	Note 5
Spectral Line Half-Width	△λ	055TGKS 055TBKS		45 35		nm	
Forward Voltage	VF	055TGKS 055TBKS		3.5 3.5	4.0 4.0	V	IF = 20mA
Reverse Current	IR	055TGKS 055TBKS			100	μA	VR = 5V
Capacitance	C	055TGKS 055TBKS		70		PF	VF=0, f=1MHZ

Notes:

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. θ ½ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. Iv classification code is marked on each packing bag.
4. The Iv guarantee should be added ± 15%.
5. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.
6. Precautions in handling:
   - When soldering, leave 2mm of minimum clearance from the resin to the soldering point.
   - Dipping the resin to solder must be avoided.
   - Correcting the soldered position after soldering must be avoided.
   - In soldering, do not apply any stress to the lead frame particularly when heated.
   - Lead forming must be done before soldering.
   - It is necessary to cut the lead frame at normal temperature.
7. Caution in ESD:
   - Static Electricity and surge damages the LED. It is recommend to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

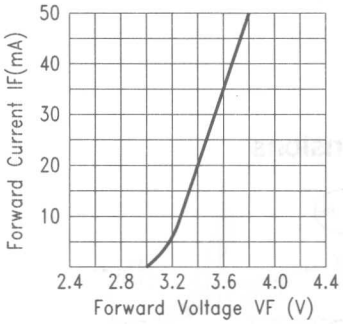


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

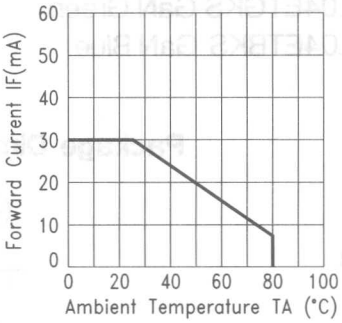


Fig.3 FORWARD CURRENT DERATING CURVE

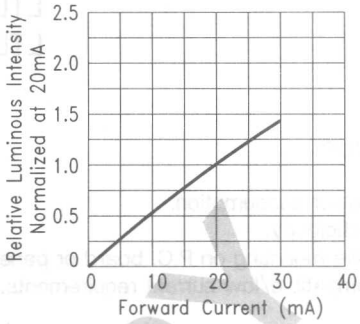


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

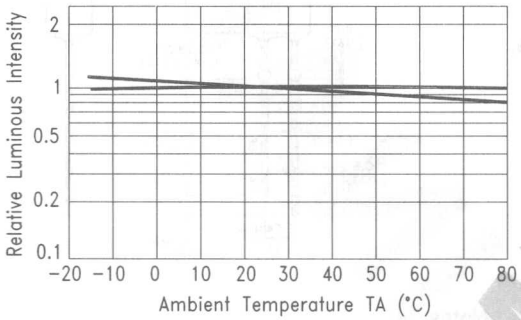


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

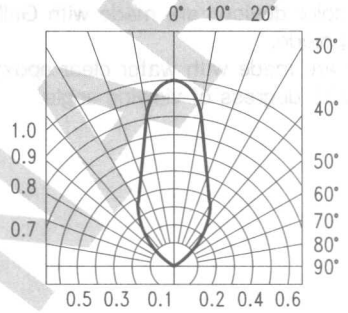


Fig.6 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

Oval 4mm Ultra Bright GaN LED Lamps

LTL04ETGKS GaN Green
LTL04ETBKS GaN Blue

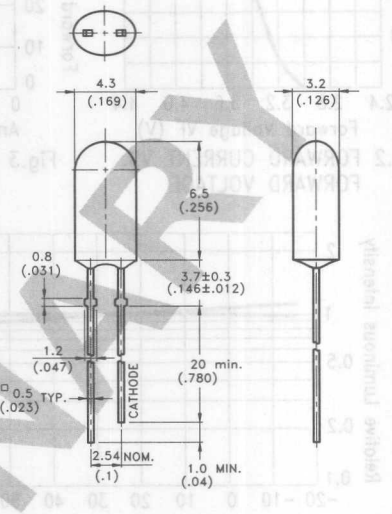
Features

- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.

Description

The source color devices are made with Gallium Nitride light emitting diode.
The devices are made with water clear epoxy package, and with 80/35 degress of viewing angle.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
04ETGKS	Water Clear	Non-diffused	GaN Green
04ETBKS	Water Clear	Non-diffused	GaN Blue

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Blue	Unit
Power Dissipation	120	120	mV
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	100	100	mA
Continuous Forward Current	30	30	mA
Reverse Voltage	5	5	V
Operating Temperature Range	-25 ℃ to + 80 ℃		
Storage Temperature Range	-30 ℃ to + 100 ℃		
Lead Soldering Temperature [2.0mm(0.079 in)From Body]	260 ℃ for 5 Seconds		

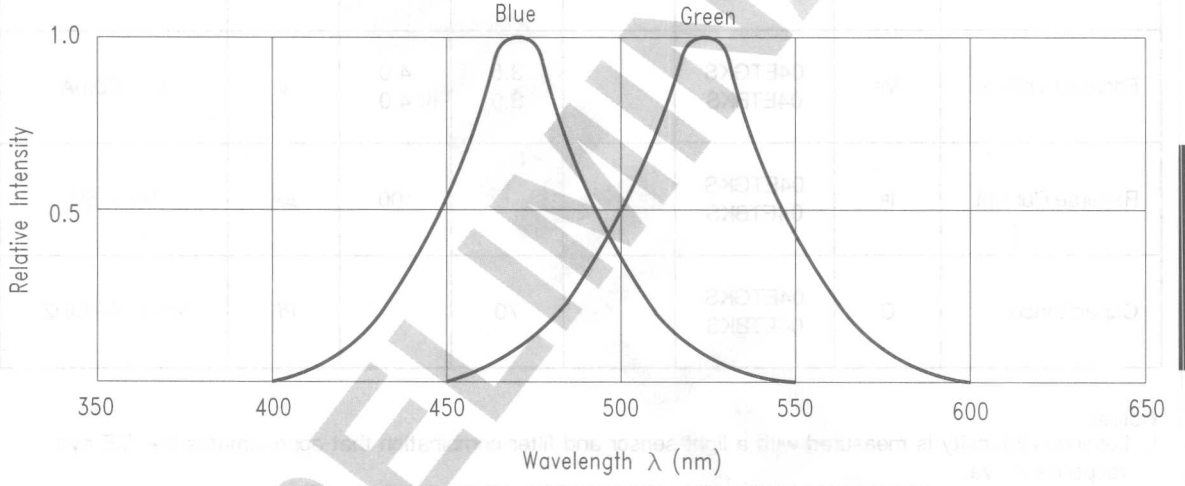


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical / Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	04ETGKS 04ETBKS	460 160	600 210		mcd	IF=20mA Note 1
Viewing Angle	2 θ ½	04ETGKS 04ETBKS		80/35		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	04ETGKS 04ETBKS		530 475		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd	04ETGKS 04ETBKS	520 465		540 480	nm	Note 5
Spectral Line Half-Width	△λ	04ETGKS 04ETBKS		45 35		nm	
Forward Voltage	VF	04ETGKS 04ETBKS		3.5 3.5	4.0 4.0	V	IF = 20mA
Reverse Current	IR	04ETGKS 04ETBKS			100	μA	VR = 5V
Capacitance	C	04ETGKS 04ETBKS		70		PF	VF=0, f=1MHZ

Notes:

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. Iv classification code is marked on each packing bag.
4. The Iv guarantee should be added ± 15%.
5. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.
6. Precautions in handling:
   - When soldering, leave 2mm of minimum clearance from the resin to the soldering point.
   - Dipping the resin to solder must be avoided.
   - Correcting the soldered position after soldering must be avoided.
   - In soldering, do not apply any stress to the lead frame particularly when heated.
   - Lead forming must be done before soldering.
   - It is necessary to cut the lead frame at normal temperature.
7. Caution in ESD:
   - Static Electricity and surge damages the LED. It is recommend to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

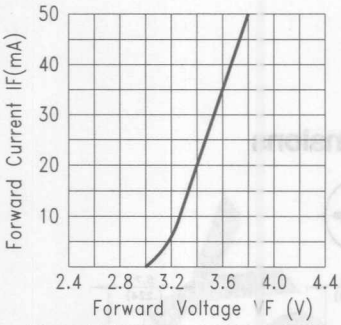


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

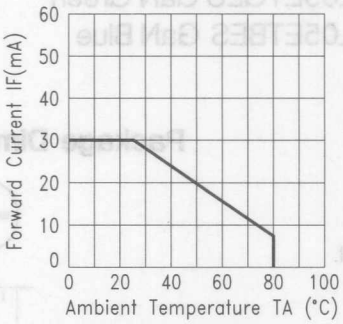


Fig.3 FORWARD CURRENT DERATING CURVE

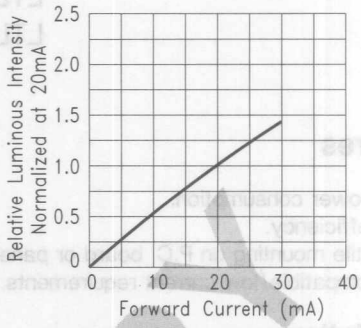


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

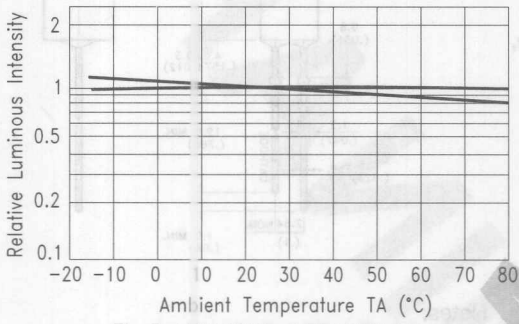


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

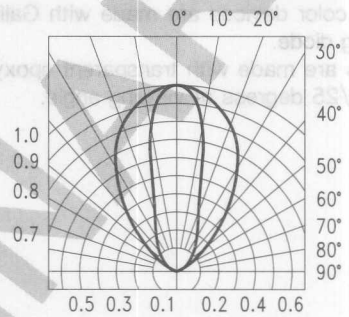


Fig.6 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

Oval 5mm Ultra Bright GaN LED Lamps

LTL05ETGES GaN Green
LTL05ETBES GaN Blue

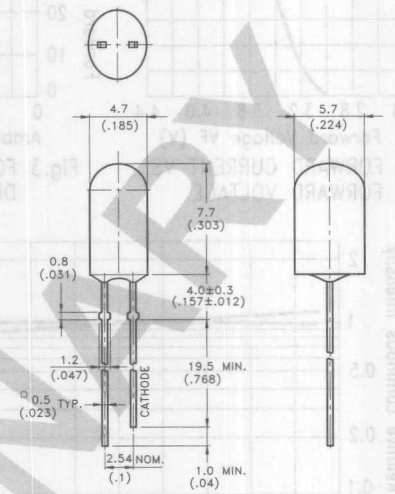
Features

- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.

Description

The source color devices are made with Gallium Nitride light emitting diode.
The devices are made with transparent epoxy package, and with 70/25 degress of viewing angle.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
05ETGES	Green	Transparent	GaN Green
05ETBES	Blue	Transparent	GaN Blue

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Blue	Unit
Power Dissipation	120	120	mV
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	100	100	mA
Continuous Forward Current	30	30	mA
Reverse Voltage	5	5	V
Operating Temperature Range	-25 ℃ to + 80 ℃		
Storage Temperature Range	-30 ℃ to + 100 ℃		
Lead Soldering Temperature [2.0mm(0.079 in)From Body]	260 ℃ for 5 Seconds		

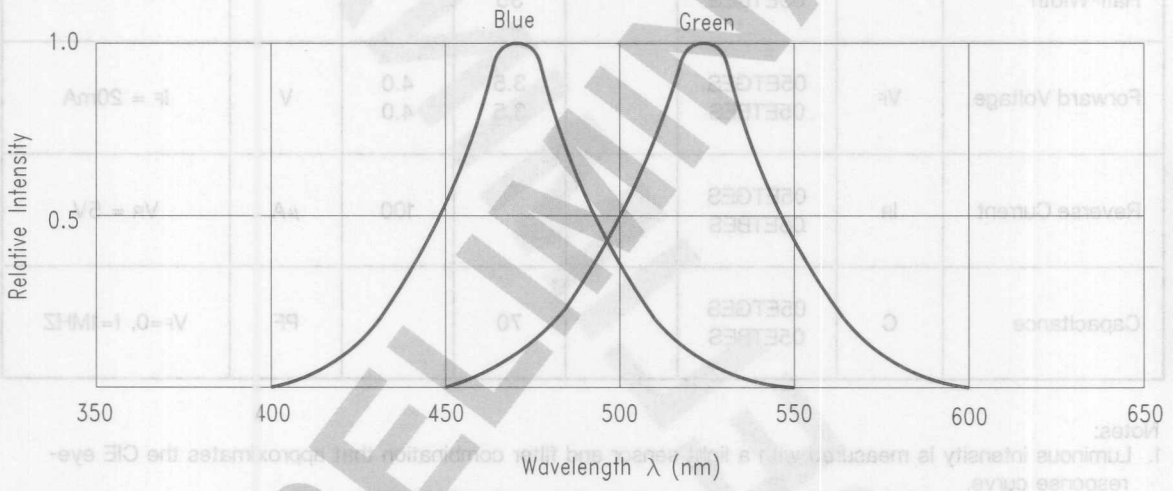


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical / Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	05ETGES 05ETBES	840 290	1100 390		mcd	IF=20mA Note 1
Viewing Angle	2 θ 1/2	05ETGES 05ETBES		70/25		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	05ETGES 05ETBES		530 475		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd	05ETGES 05ETBES	520 465		540 480	nm	Note 5
Spectral Line Half-Width	△λ	05ETGES 05ETBES		45 35		nm	
Forward Voltage	VF	05ETGES 05ETBES		3.5 3.5	4.0 4.0	V	IF = 20mA
Reverse Current	IR	05ETGES 05ETBES			100	μA	VR = 5V
Capacitance	C	05ETGES 05ETBES		70		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. Iv classification code is marked on each packing bag.
4. The Iv guarantee should be added ± 15%.
5. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.
6. Precautions in handling:
   - When soldering, leave 2mm of minimum clearance from the resin to the soldering point.
   - Dipping the resin to solder must be avoided.
   - Correcting the soldered position after soldering must be avoided.
   - In soldering, do not apply any stress to the lead frame particularly when heated.
   - Lead forming must be done before soldering.
   - It is necessary to cut the lead frame at normal temperature.
7. Caution in ESD:
   - Static Electricity and surge damages the LED. It is recommend to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

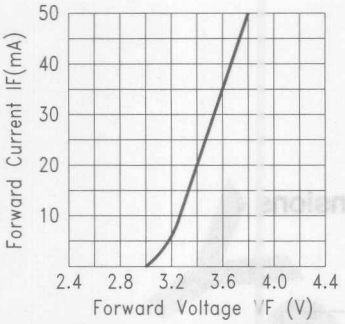


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

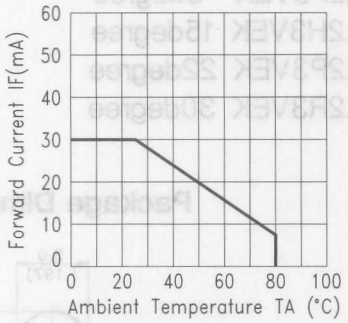


Fig.3 FORWARD CURRENT DERATING CURVE

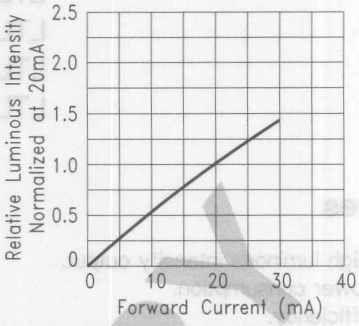


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

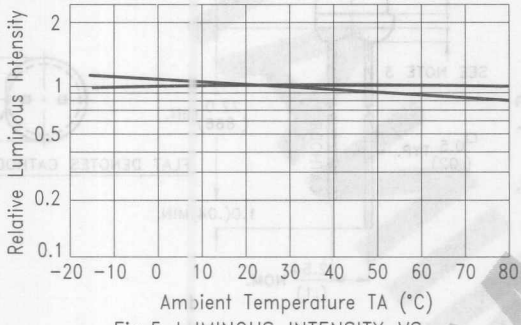


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

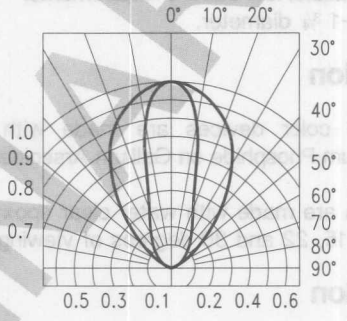


Fig.6 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AlInGaP Orange LED Lamps

LTL2F3VEK 8degree
LTL2H3VEK 15degree
LTL2P3VEK 22degree
LTL2R3VEK 30degree

Features

- Very high luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

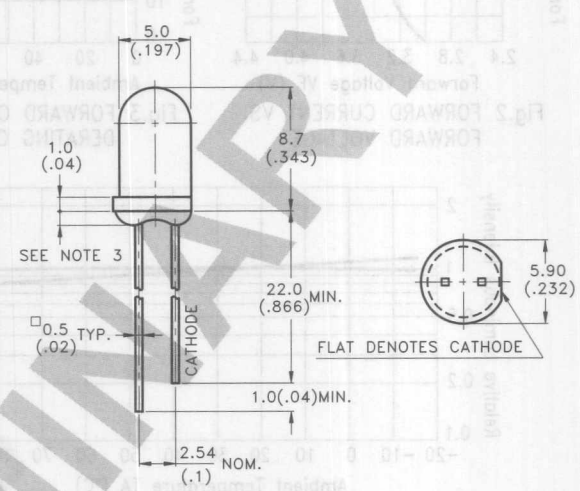
Description

The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for outdoor application.
- Message sign.
- Traffic sign.
- Automotive exterior lights.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3VEK	Water Clear	Non-diffused	AlInGaP Orange
2H3VEK	Water Clear	Non-diffused	AlInGaP Orange
2P3VEK	Water Clear	Non-diffused	AlInGaP Orange
2R3VEK	Water Clear	Non-diffused	AlInGaP Orange

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Orange	Unit
Power Dissipation	130	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

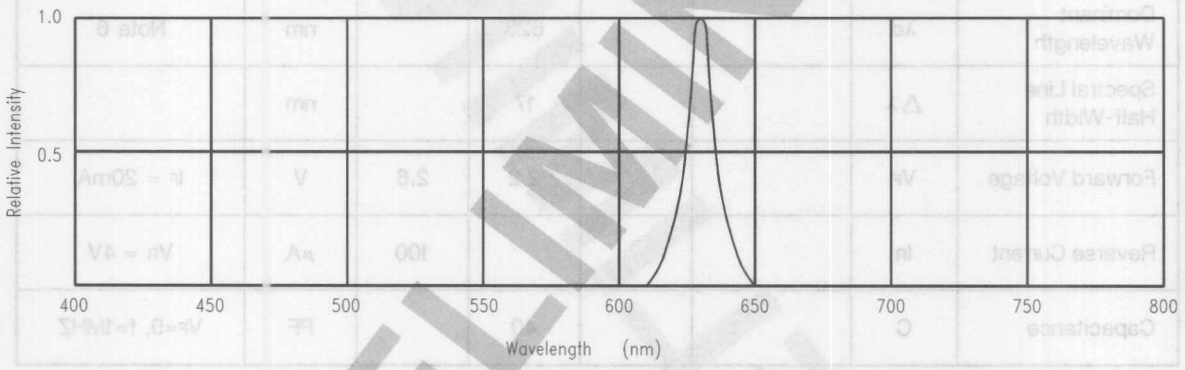


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3VEK	1800	4800		mcd	IF=20mA Note 1 Note 2
		2F3VEK-TU	1800		6400		
		2F3VEK-UV	3200		11200		
		2H3VEK	1000	2600			
		2H3VEK-ST	1000		3600		
		2H3VEK-TU	1800		6400		
		2P3VEK	560	1800			
		2P3VEK-RS	560		2000		
		2P3VEK-ST	1000		3600		
		2R3VEK	320	1200			
		2R3VEK-QR	320		1120		
		2R3VEK-RS	560		2000		
Viewing Angle	2 θ 1/2	2F3VEK		8		deg	Note 3 (Fig.6)
		2H3VEK		15			
		2P3VEK		22			
		2R3VEK		30			
Peak Emission Wavelength	λP			634		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			623		nm	Note 6
Spectral Line Half-Width	△λ			17		nm	
Forward Voltage	VF			2.2	2.6	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrica /Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

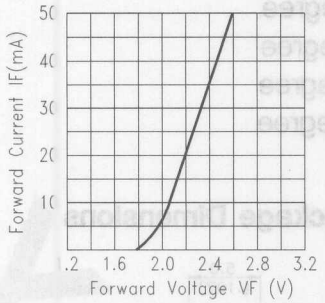


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

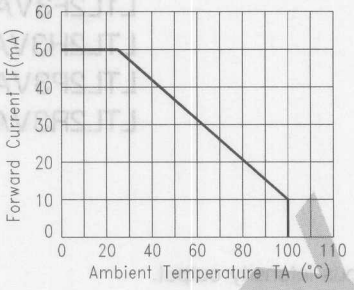


Fig.3 FORWARD CURRENT DERATING CURVE

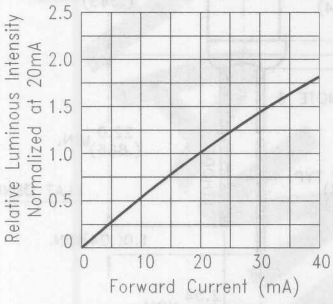


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

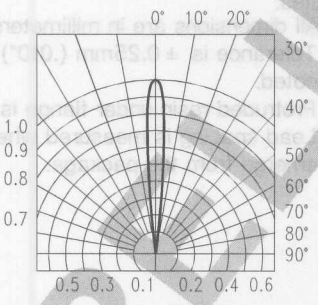


Fig.5-1 SPATIAL DISTRIBUTION

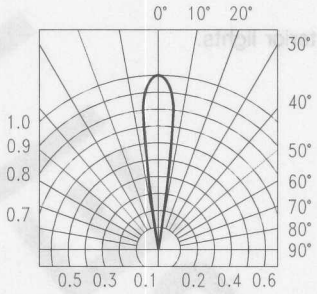


Fig.5-2 SPATIAL DISTRIBUTION

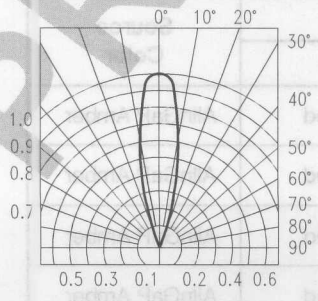


Fig.5-3 SPATIAL DISTRIBUTION

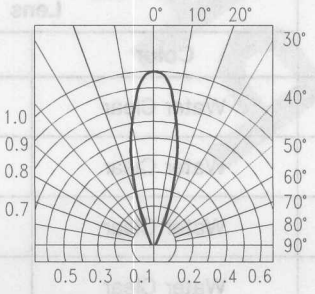


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AlInGaP Amber LED Lamps

LTL2F3VAK 8degree
LTL2H3VAK 15degree
LTL2P3VAK 22degree
LTL2R3VAK 30degree

Features

- Very high luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

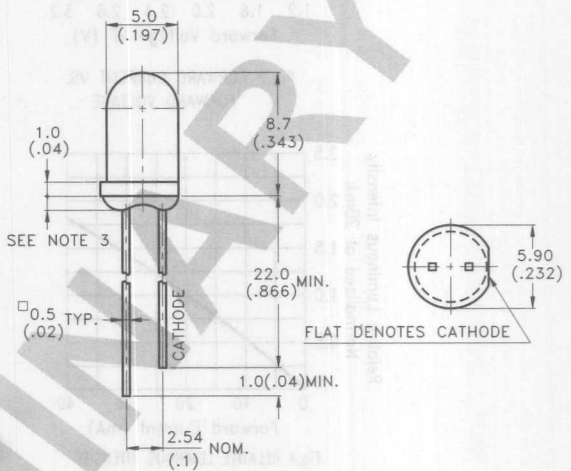
Description

The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for outdoor application.
- Message sign.
- Traffic sign.
- Automotive exterior lights.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3VAK	Water Clear	Non-diffused	AlInGaP Amber
2H3VAK	Water Clear	Non-diffused	AlInGaP Amber
2P3VAK	Water Clear	Non-diffused	AlInGaP Amber
2R3VAK	Water Clear	Non-diffused	AlInGaP Amber

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Amber	Unit
Power Dissipation	130	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

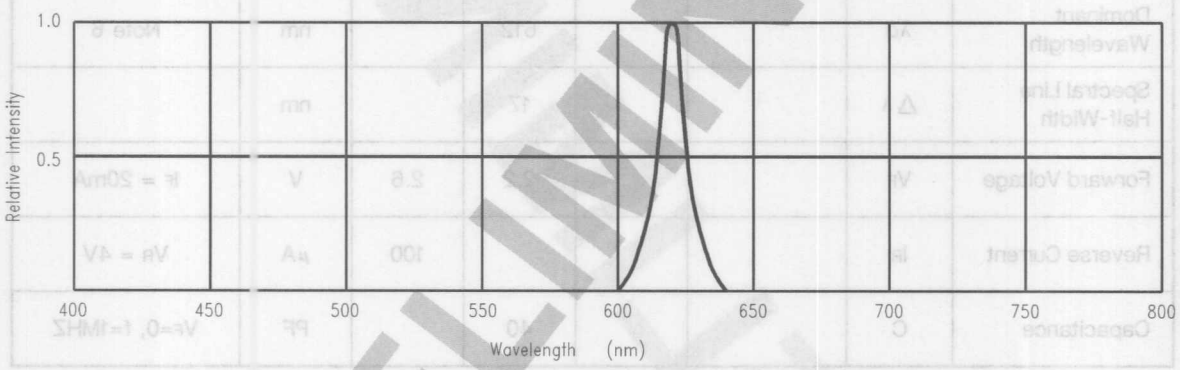


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3VAK	1800	7000		mcd	IF=20mA Note 1 Note 2
		2F3VAK-TU	1800		6400		
		2F3VAK-UV	3200		11200		
		2H3VAK	1000	3600			
		2H3VAK-ST	1000		3600		
		2H3VAK-TU	1800		6400		
		2P3VAK	560	2300			
		2P3VAK-RS	560		2000		
		2P3VAK-ST	1000		3600		
		2R3VAK	320	1500			
		2R3VAK-QR	320		1120		
		2R3VAK-RS	560		2000		
Viewing Angle	2 θ 1/2	2F3VAK		8		deg	Note 3 (Fig.6)
		2H3VAK		15			
		2P3VAK		22			
		2R3VAK		30			
Peak Emission Wavelength	λP			623		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			612		nm	Note 6
Spectral Line Half-Width	△λ			17		nm	
Forward Voltage	VF			2.2	2.6	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

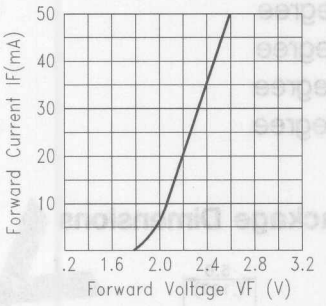


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

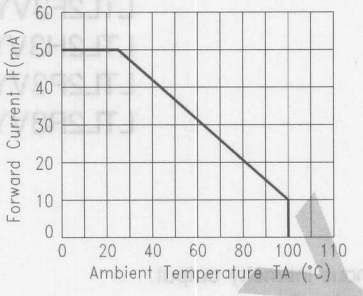


Fig.3 FORWARD CURRENT DERATING CURVE

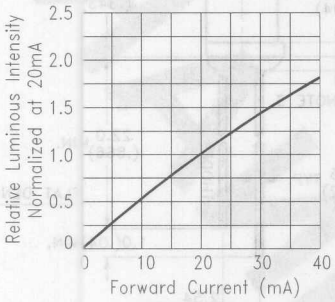


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

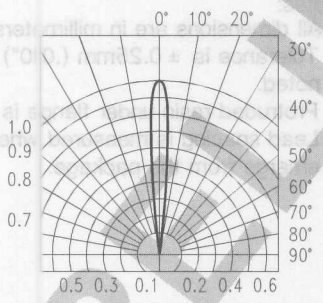


Fig.5-1 SPATIAL DISTRIBUTION

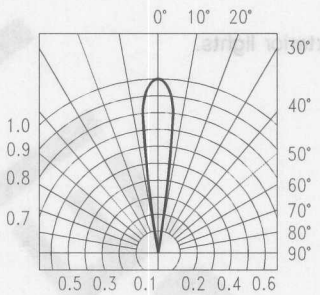


Fig.5-2 SPATIAL DISTRIBUTION

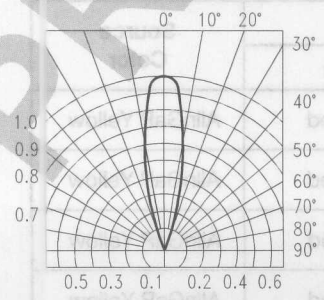


Fig.5-3 SPATIAL DISTRIBUTION

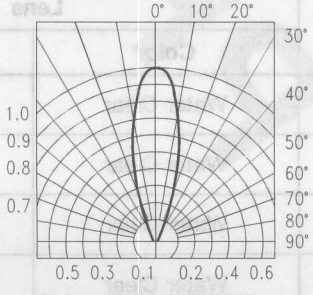


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AlInGaP Yellow LED Lamps

LTL2F3VYK 8degree
LTL2H3VYK 15degree
LTL2P3VYK 22degree
LTL2R3VYK 30degree

Features

- Very high luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

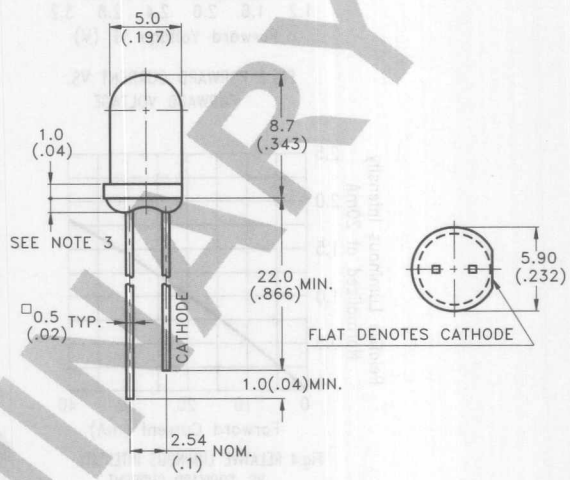
Description

The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for outdoor application.
- Message sign.
- Traffic sign.
- Automotive exterior lights.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3VYK	Water Clear	Non-diffused	AlInGaP Yellow
2H3VYK	Water Clear	Non-diffused	AlInGaP Yellow
2P3VYK	Water Clear	Non-diffused	AlInGaP Yellow
2R3VYK	Water Clear	Non-diffused	AlInGaP Yellow

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	130	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

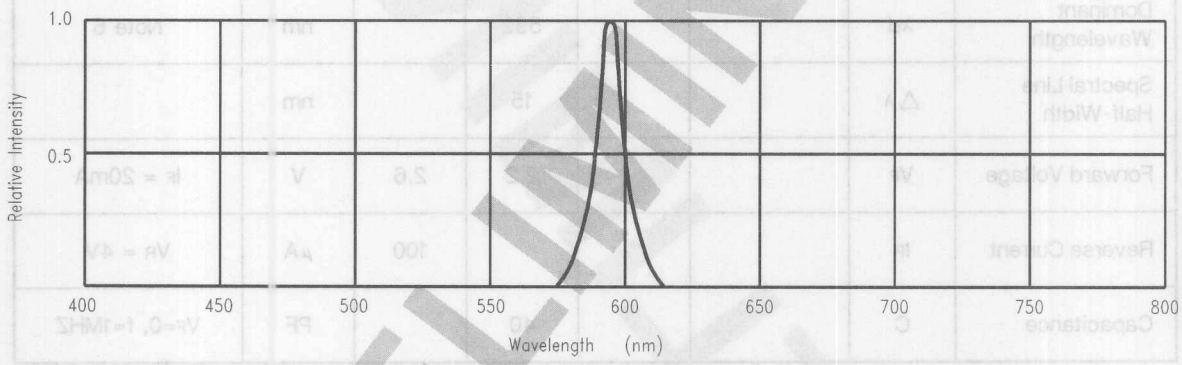


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3VYK	1800	7000		mcd	IF=20mA Note 1 Note 2
		2F3VYK-TU	1800		6400		
		2F3VYK-UV	3200		11200		
		2H3VYK	1000	3600			
		2H3VYK-ST	1000		3600		
		2H3VYK-TU	1800		6400		
		2P3VYK	560	2300			
		2P3VYK-RS	560		2000		
		2P3VYK-ST	1000		3600		
		2R3VYK	320	1500			
		2R3VYK-QR	320		1120		
		2R3VYK-RS	560		2000		
Viewing Angle	2 θ 1/2	2F3VYK		8		deg	Note 3 (Fig.6)
		2H3VYK		15			
		2P3VYK		22			
		2R3VYK		30			
Peak Emission Wavelength	λP			595		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			592		nm	Note 6
Spectral Line Half-Width	△λ			15		nm	
Forward Voltage	VF			2.2	2.6	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

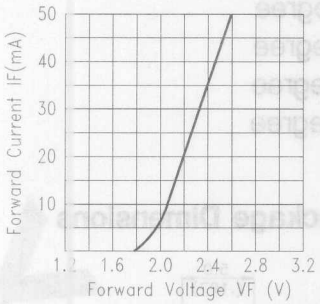


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

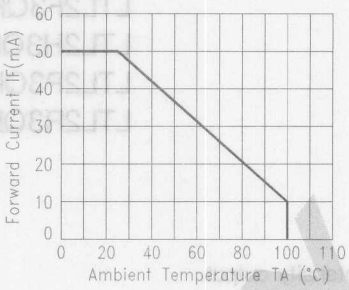


Fig.3 FORWARD CURRENT DERATING CURVE

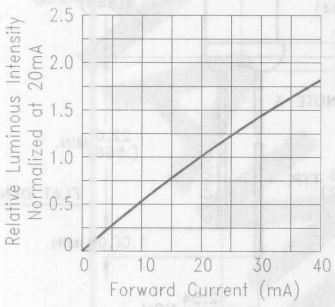


Fig. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

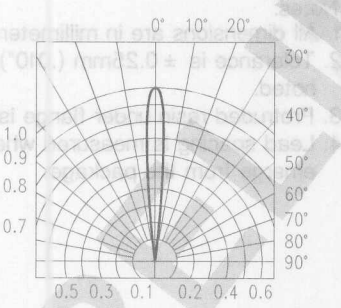


Fig.5-1 SPATIAL DISTRIBUTION

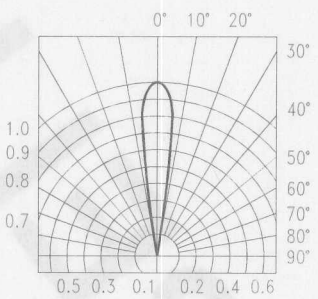


Fig.5-2 SPATIAL DISTRIBUTION

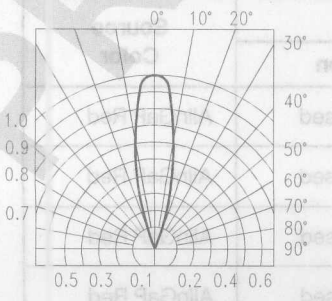


Fig.5-3 SPATIAL DISTRIBUTION

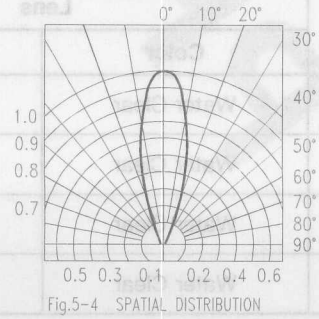


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Red LED Lamps

LTL2F3QRK 8degree
LTL2H3QRK 15degree
LTL2P3QRK 22degree
LTL2R3QRK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

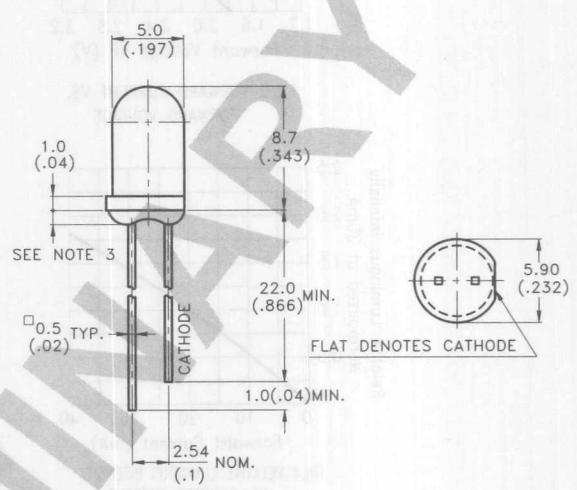
The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for half-outdoor and outdoor application.

- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3QRK	Water Clear	Non-diffused	AlInGaP Red
2H3QRK	Water Clear	Non-diffused	AlInGaP Red
2P3QRK	Water Clear	Non-diffused	AlInGaP Red
2R3QRK	Water Clear	Non-diffused	AlInGaP Red

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Unit
Power Dissipation	120	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

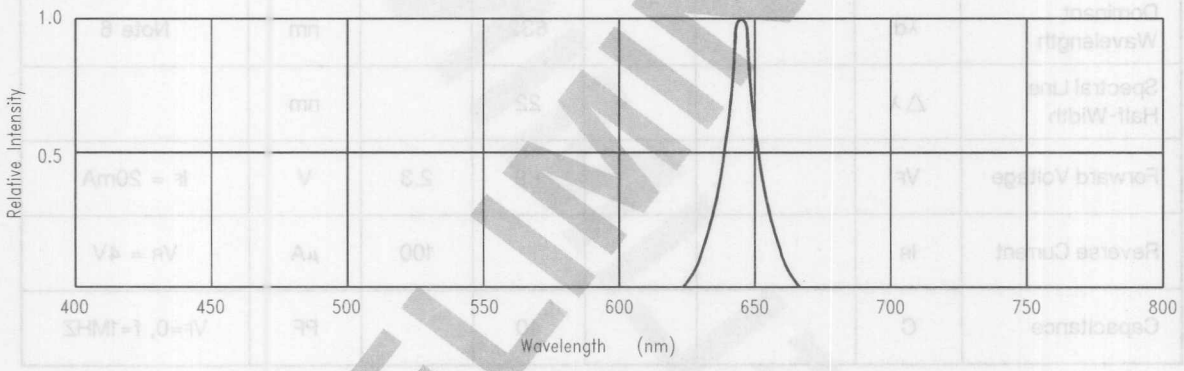


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3QRK	1000	2600		mcd	IF=20mA Note 1 Note 2
		2F3QRK-ST	1000		3600		
		2F3QRK-TU	1800		6400		
		2H3QRK	560	1500			
		2H3QRK-RS	560		2000		
		2H3QRK-ST	1000		3600		
		2P3QRK	320	1000			
		2P3QRK-QR	320		1120		
		2P3QRK-RS	560		2000		
		2R3QRK	180	600			
		2R3QRK-PQ	180		640		
		2R3QRK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3QRK 2H3QRK 2P3QRK 2R3QRK		8 15 22 30		deg	Note 3 (Fig.6)
Peak Emission Wavelength	λP			645		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			632		nm	Note 6
Spectral Line Half-Width	△λ			22		nm	
Forward Voltage	VF			1.9	2.3	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/ Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

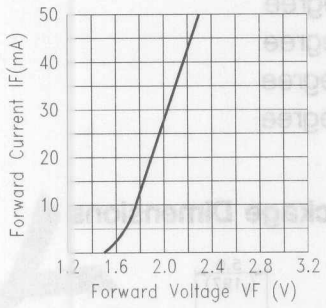


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

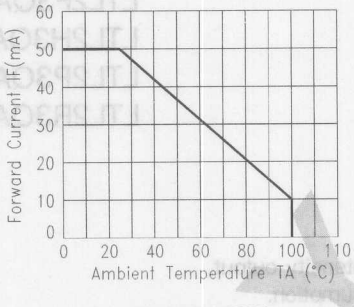


Fig.3 FORWARD CURRENT DERATING CURVE

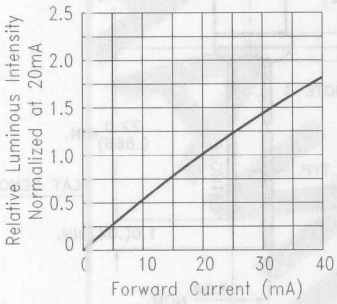


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

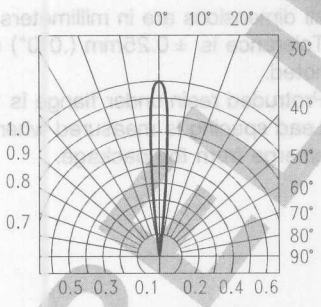


Fig.5-1 SPATIAL DISTRIBUTION

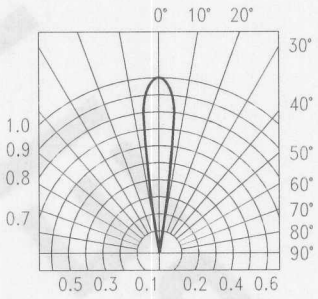


Fig.5-2 SPATIAL DISTRIBUTION

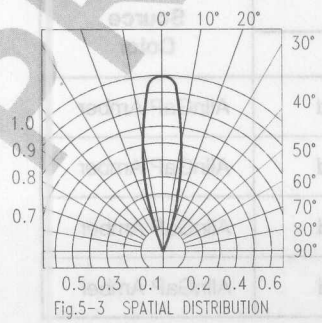


Fig.5-3 SPATIAL DISTRIBUTION

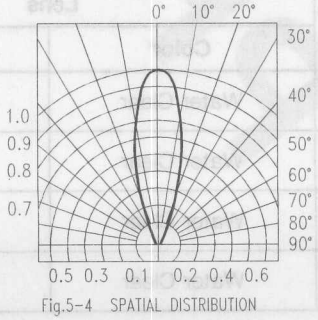


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Amber LED Lamps

LTL2F3QAK 8degree
LTL2H3QAK 15degree
LTL2P3QAK 22degree
LTL2R3QAK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

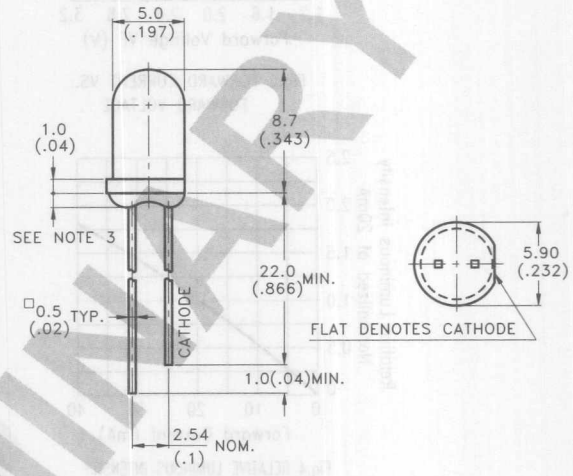
The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for half-outdoor and outdoor application.

- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3QAK	Water Clear	Non-diffused	AlInGaP Amber
2H3QAK	Water Clear	Non-diffused	AlInGaP Amber
2P3QAK	Water Clear	Non-diffused	AlInGaP Amber
2R3QAK	Water Clear	Non-diffused	AlInGaP Amber

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Amber	Unit
Power Dissipation	120	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

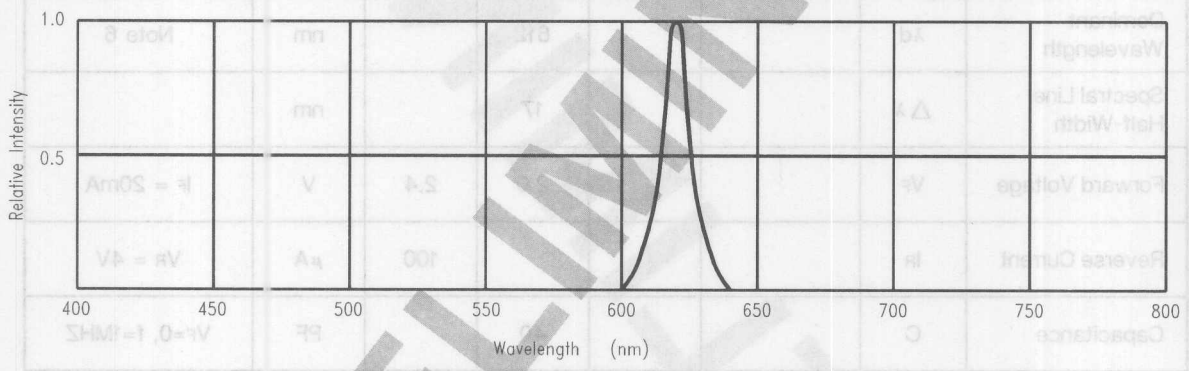


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3QAK	1000	3600		mcd	IF=20mA Note 1 Note 2
		2F3QAK-ST	1000		3600		
		2F3QAK-TU	1800		6400		
		2H3QAK	560	2000			
		2H3QAK-RS	560		2000		
		2H3QAK-ST	1000		3600		
		2P3QAK	320	1400			
		2P3QAK-QR	320		1120		
		2P3QAK-RS	560		2000		
		2R3QAK	180	900			
		2R3QAK-PQ	180		640		
		2R3QAK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3QAK		8		deg	Note 3 (Fig.6)
		2H3QAK		15			
		2P3QAK		22			
		2R3QAK		30			
Peak Emission Wavelength	λP			623		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			612		nm	Note 6
Spectral Line Half-Width	△λ			17		nm	
Forward Voltage	VF			2.0	2.4	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ± 15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrica /Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

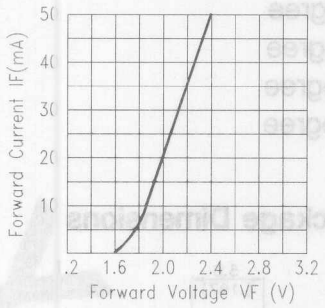


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

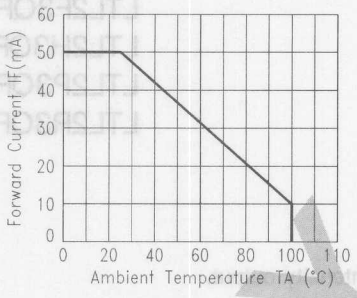


Fig.3 FORWARD CURRENT DERATING CURVE

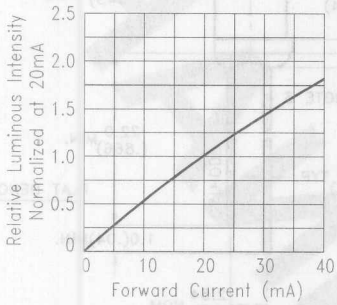


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

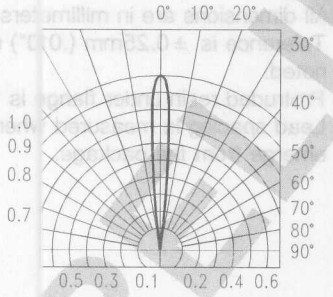


Fig.5-1 SPATIAL DISTRIBUTION

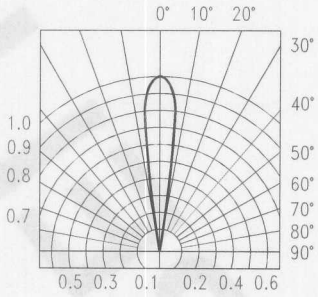


Fig.5-2 SPATIAL DISTRIBUTION

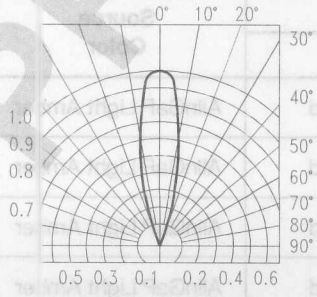


Fig.5-3 SPATIAL DISTRIBUTION

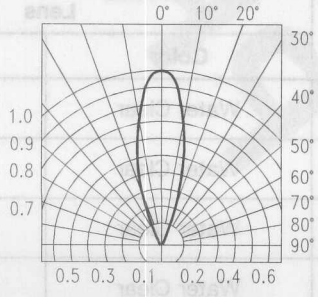


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Light Amber LED Lamps

LTL2F3QFK 8degree
LTL2H3QFK 15degree
LTL2P3QFK 22degree
LTL2R3QFK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

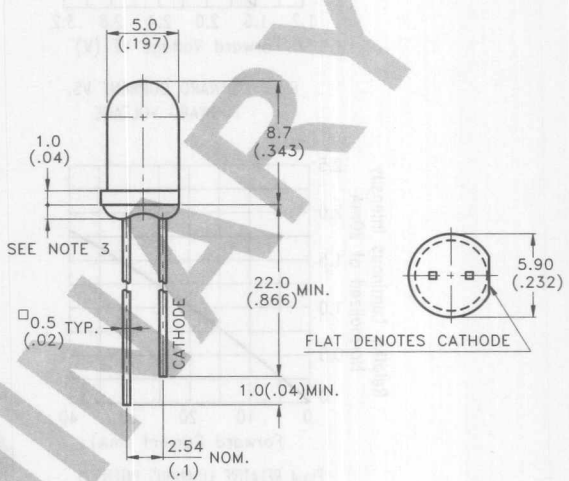
The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for half-outdoor and outdoor application.

- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3QFK	Water Clear	Non-diffused	AlInGaP Light Amber
2H3QFK	Water Clear	Non-diffused	AlInGaP Light Amber
2P3QFK	Water Clear	Non-diffused	AlInGaP Light Amber
2R3QFK	Water Clear	Non-diffused	AlInGaP Light Amber

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Light Amber	Unit
Power Dissipation	120	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

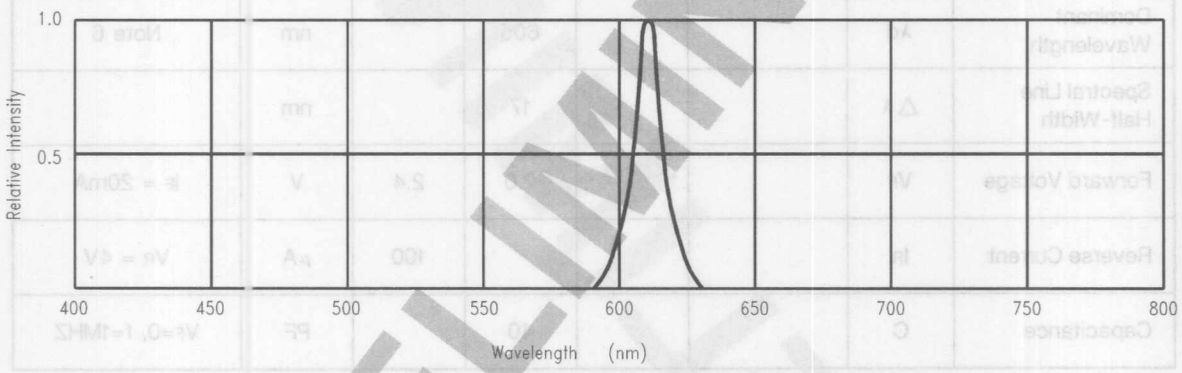


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3QFK	1000	3600		mcd	IF=20mA Note 1 Note 2
		2F3QFK-ST	1000		3600		
		2F3QFK-TU	1800		6400		
		2H3QFK	560	2000			
		2H3QFK-RS	560		2000		
		2H3QFK-ST	1000		3600		
		2P3QFK	320	1400			
		2P3QFK-QR	320		1120		
		2P3QFK-RS	560		2000		
		2R3QFK	180	900			
		2R3QFK-PQ	180		640		
		2R3QFK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3QFK		8		deg	Note 3 (Fig.6)
		2H3QFK		15			
		2P3QFK		22			
		2R3QFK		30			
Peak Emission Wavelength	λP			612		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			605		nm	Note 6
Spectral Line Half-Width	△λ			17		nm	
Forward Voltage	VF			2.0	2.4	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ± 15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

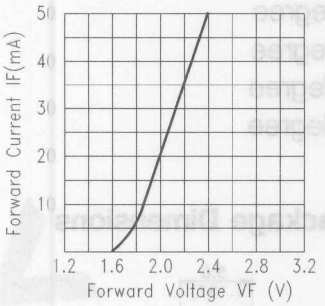


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

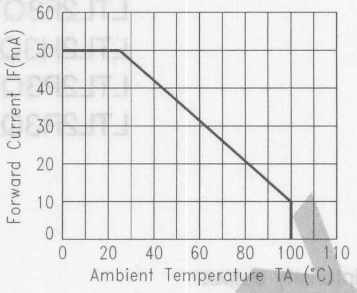


Fig.3 FORWARD CURRENT DERATING CURVE

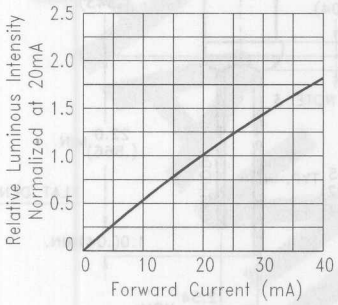


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

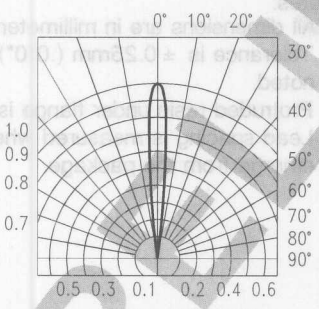


Fig.5-1 SPATIAL DISTRIBUTION

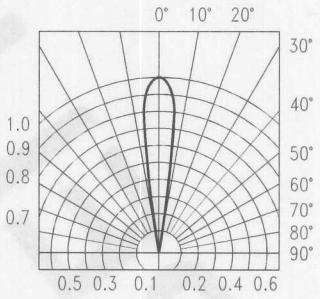


Fig.5-2 SPATIAL DISTRIBUTION

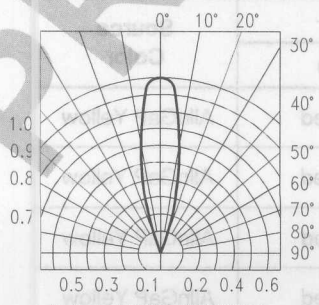


Fig.5-3 SPATIAL DISTRIBUTION

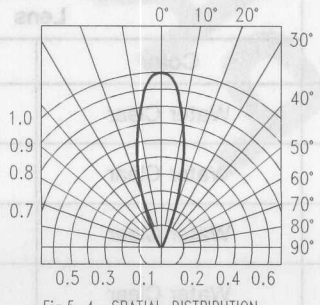


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Yellow LED Lamps

LTL2F3QYK 8degree
LTL2H3QYK 15degree
LTL2P3QYK 22degree
LTL2R3QYK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

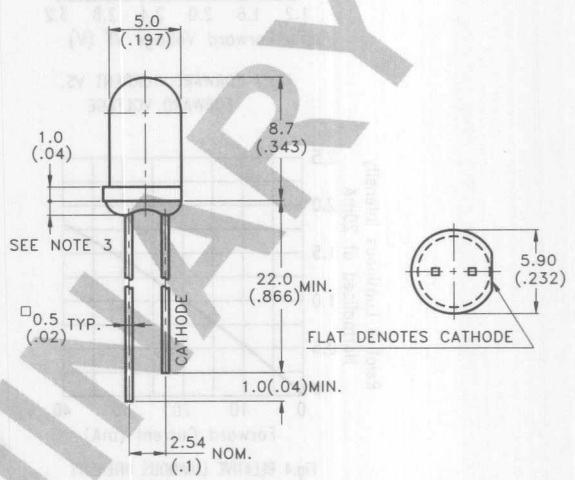
The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for half-outdoor and outdoor application.

- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3QYK	Water Clear	Non-diffused	AlInGaP Yellow
2H3QYK	Water Clear	Non-diffused	AlInGaP Yellow
2P3QYK	Water Clear	Non-diffused	AlInGaP Yellow
2R3QYK	Water Clear	Non-diffused	AlInGaP Yellow

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	120	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

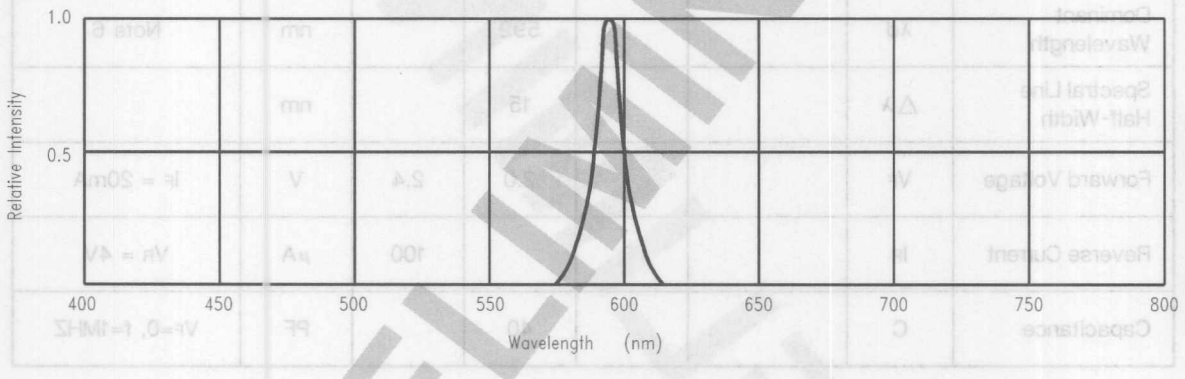


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3QYK	1000	3600		mcd	IF=20mA Note 1 Note 2
		2F3QYK-ST	1000		3600		
		2F3QYK-TU	1800		6400		
		2H3QYK	560	2000			
		2H3QYK-RS	560		2000		
		2H3QYK-ST	1000		3600		
		2P3QYK	320	1400			
		2P3QYK-QR	320		1120		
		2P3QYK-RS	560		2000		
		2R3QYK	180	900			
		2R3QYK-PQ	180		640		
		2R3QYK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3QYK		8		deg	Note 3 (Fig.6)
		2H3QYK		15			
		2P3QYK		22			
		2R3QYK		30			
Peak Emission Wavelength	λP			595		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			592		nm	Note 6
Spectral Line Half-Width	△λ			15		nm	
Forward Voltage	VF			2.0	2.4	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

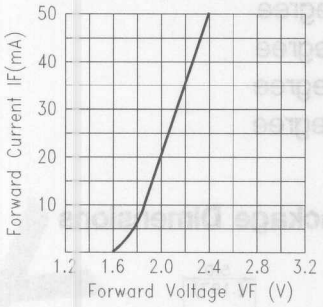


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

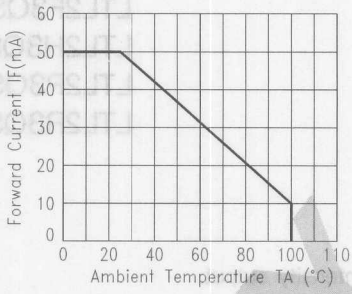


Fig.3 FORWARD CURRENT DERATING CURVE

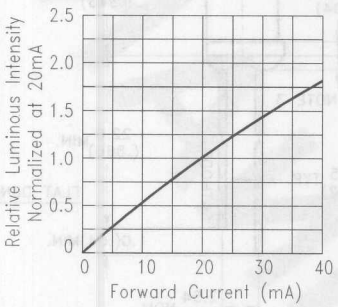


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

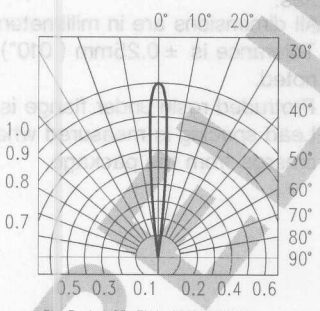


Fig.5-1 SPATIAL DISTRIBUTION

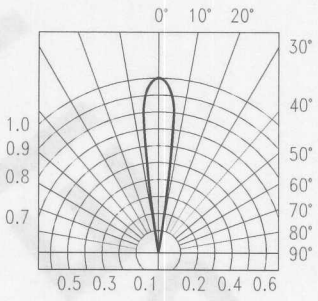


Fig.5-2 SPATIAL DISTRIBUTION

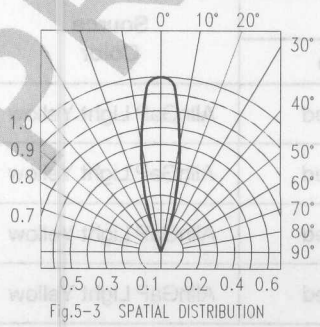


Fig.5-3 SPATIAL DISTRIBUTION

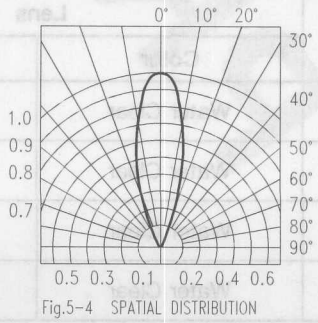


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Light Yellow LED Lamps

LTL2F3QSK 8degree
LTL2H3QSK 15degree
LTL2P3QSK 22degree
LTL2R3QSK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

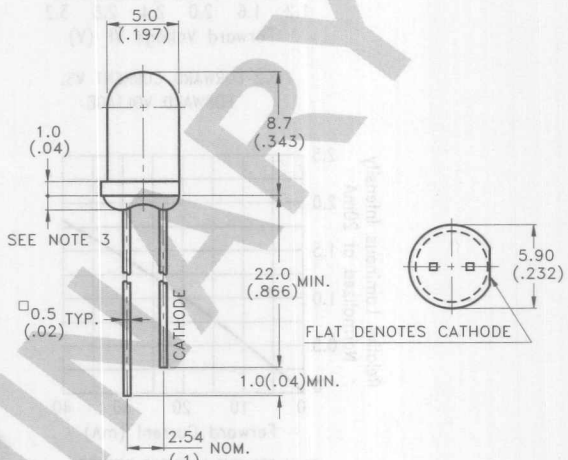
The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for half-outdoor and outdoor application.

- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3QSK	Water Clear	Non-diffused	AlInGaP Light Yellow
2H3QSK	Water Clear	Non-diffused	AlInGaP Light Yellow
2P3QSK	Water Clear	Non-diffused	AlInGaP Light Yellow
2R3QSK	Water Clear	Non-diffused	AlInGaP Light Yellow

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Light Yellow	Unit
Power Dissipation	120	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	50	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

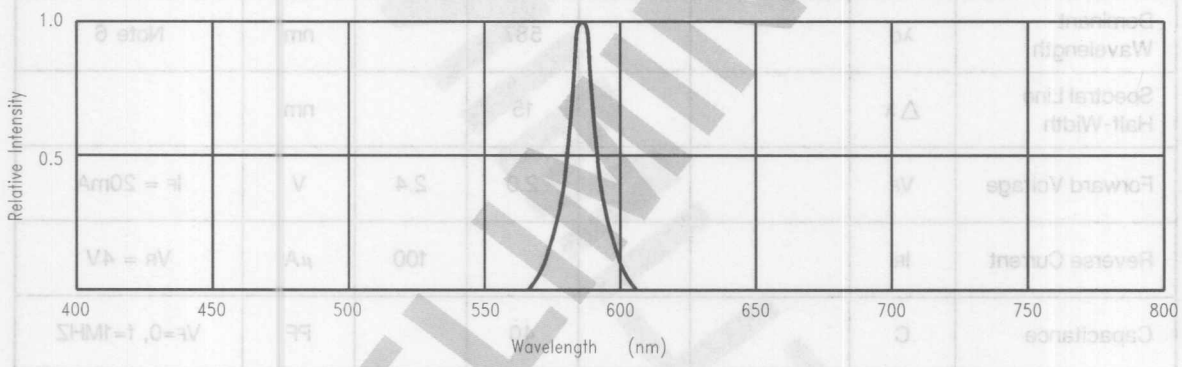


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3QSK	1000	3600		mcd	IF=20mA Note 1 Note 2
		2F3QSK-ST	1000		3600		
		2F3QSK-TU	1800		6400		
		2H3QSK	560	2000			
		2H3QSK-RS	560		2000		
		2H3QSK-ST	1000		3600		
		2P3QSK	320	1400			
		2P3QSK-QR	320		1120		
		2P3QSK-RS	560		2000		
		2R3QSK	180	900			
		2R3QSK-PQ	180		640		
		2R3QSK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3QSK		8		deg	Note 3 (Fig.6)
		2H3QSK		15			
		2P3QSK		22			
		2R3QSK		30			
Peak Emission Wavelength	λP			588		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			587		nm	Note 6
Spectral Line Half-Width	△λ			15		nm	
Forward Voltage	VF			2.0	2.4	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

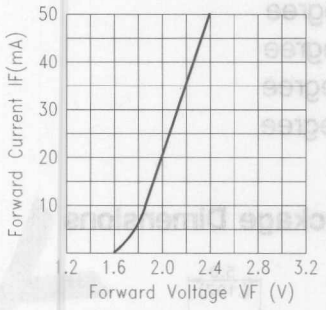


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

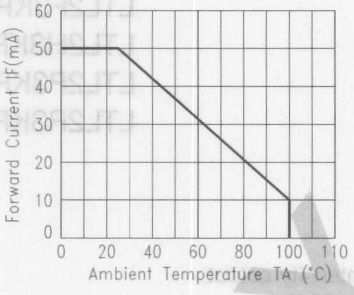


Fig.3 FORWARD CURRENT DERATING CURVE

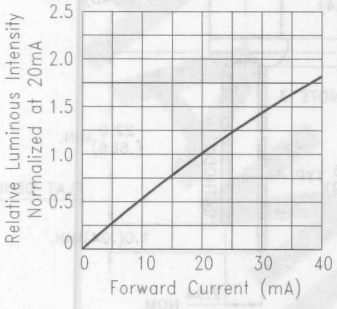


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

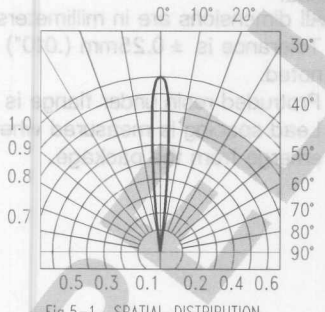


Fig.5-1 SPATIAL DISTRIBUTION

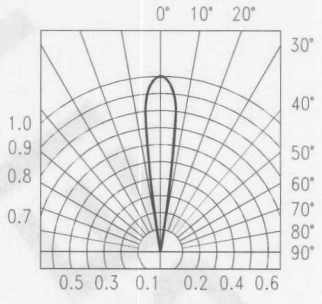


Fig.5-2 SPATIAL DISTRIBUTION

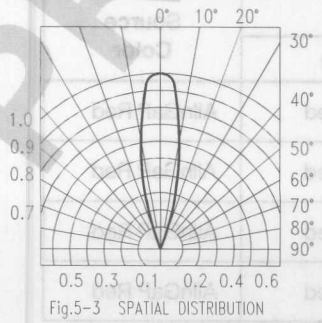


Fig.5-3 SPATIAL DISTRIBUTION

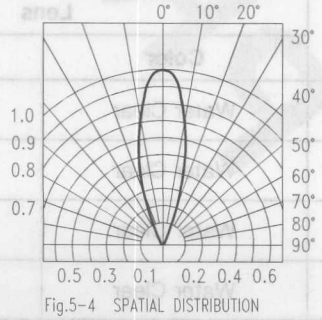


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Red LED Lamps

LTL2F3KRK 8degree
LTL2H3KRK 15degree
LTL2P3KRK 22degree
LTL2R3KRK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

Description

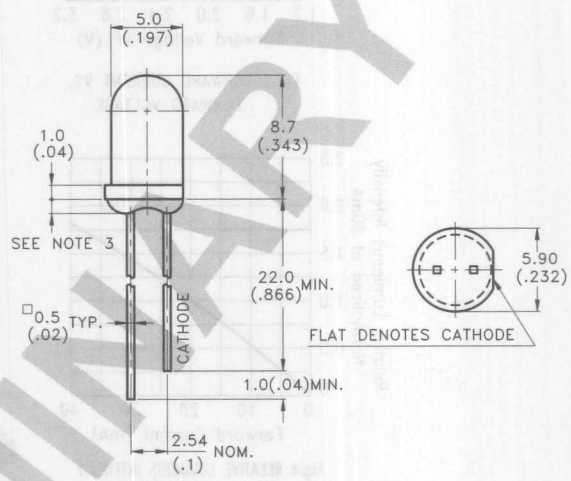
The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for indoor application.

- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3KRK	Water Clear	Non-diffused	AlInGaP Red
2H3KRK	Water Clear	Non-diffused	AlInGaP Red
2P3KRK	Water Clear	Non-diffused	AlInGaP Red
2R3KRK	Water Clear	Non-diffused	AlInGaP Red

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Unit
Power Dissipation	75	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	30	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

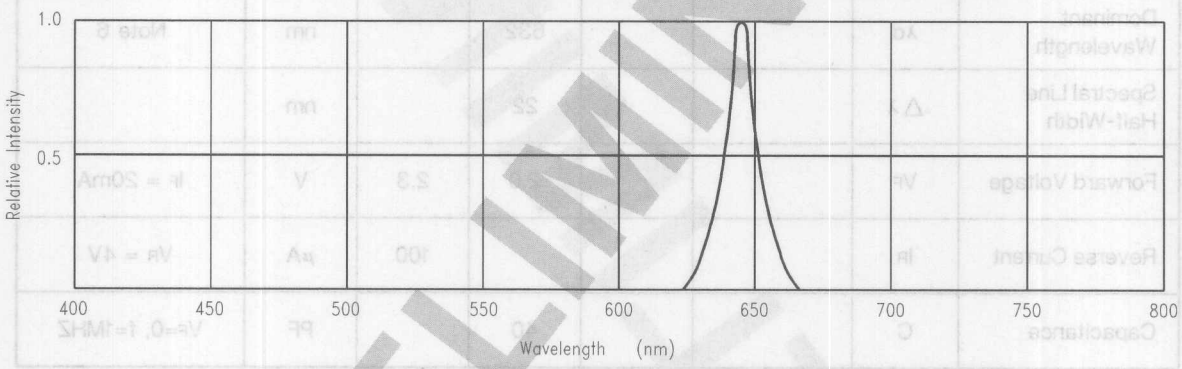


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3KRK	1000	2300		mcd	IF=20mA Note 1 Note 2
		2F3KRK-ST	1000		3600		
		2F3KRK-TU	1800		6400		
		2H3KRK	560	1400			
		2H3KRK-RS	560		2000		
		2H3KRK-ST	1000		3600		
		2P3KRK	320	900			
		2P3KRK-QR	320		1120		
		2P3KRK-RS	560		2000		
		2R3KRK	180	500			
		2R3KRK-PQ	180		640		
		2R3KRK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3KRK		8		deg	Note 3 (Fig.6)
		2H3KRK		15			
		2P3KRK		22			
		2R3KRK		30			
Peak Emission Wavelength	λP			645		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			632		nm	Note 6
Spectral Line Half-Width	△λ			22		nm	
Forward Voltage	VF			2.0	2.3	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

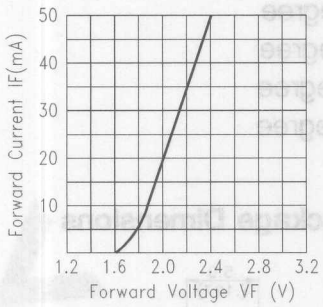


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

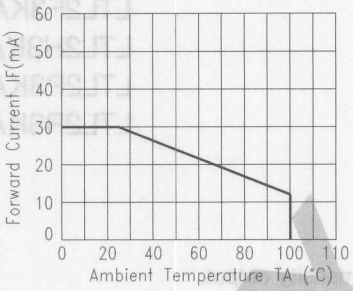


Fig.3 FORWARD CURRENT DERATING CURVE

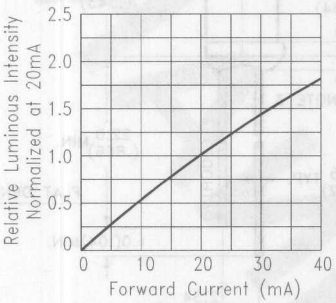


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

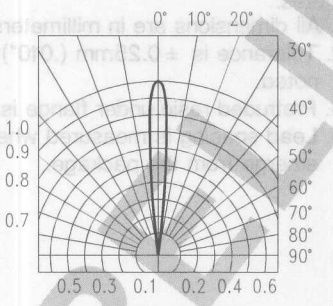


Fig.5-1 SPATIAL DISTRIBUTION

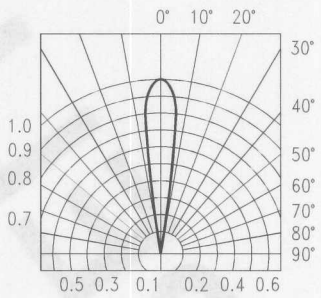


Fig.5-2 SPATIAL DISTRIBUTION

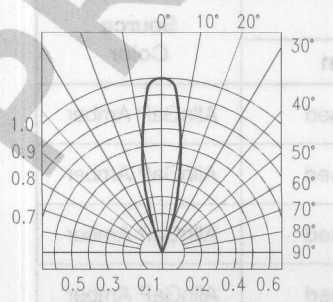


Fig.5-3 SPATIAL DISTRIBUTION

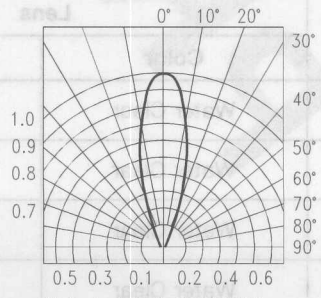


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Amber LED Lamps

LTL2F3KAK 8degree
LTL2H3KAK 15degree
LTL2P3KAK 22degree
LTL2R3KAK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

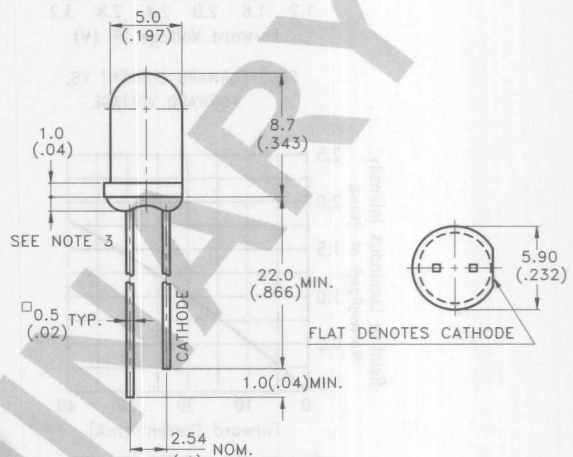
Description

The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for indoor application.
- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3KAK	Water Clear	Non-diffused	AlInGaP Amber
2H3KAK	Water Clear	Non-diffused	AlInGaP Amber
2P3KAK	Water Clear	Non-diffused	AlInGaP Amber
2R3KAK	Water Clear	Non-diffused	AlInGaP Amber

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Amber	Unit
Power Dissipation	75	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	30	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

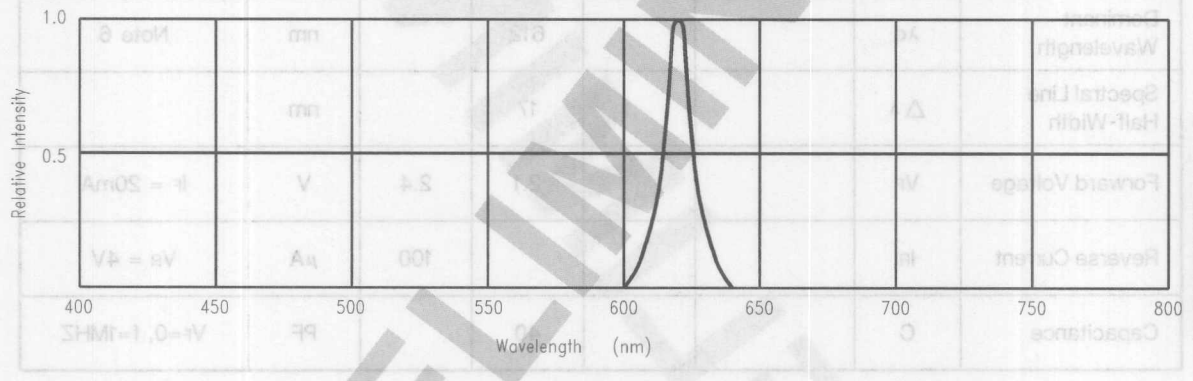


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3KAK	1000	3000		mcd	IF=20mA Note 1 Note 2
		2F3KAK-ST	1000		3600		
		2F3KAK-TU	1800		6400		
		2H3KAK	560	1700			
		2H3KAK-RS	560		2000		
		2H3KAK-ST	1000		3600		
		2P3KAK	320	1200			
		2P3KAK-QR	320		1120		
		2P3KAK-RS	560		2000		
		2R3KAK	180	700			
		2R3KAK-PQ	180		640		
		2R3KAK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3KAK		8		deg	Note 3 (Fig.6)
		2H3KAK		15			
		2P3KAK		22			
		2R3KAK		30			
Peak Emission Wavelength	λP			621		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			612		nm	Note 6
Spectral Line Half-Width	△λ			17		nm	
Forward Voltage	VF			2.1	2.4	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

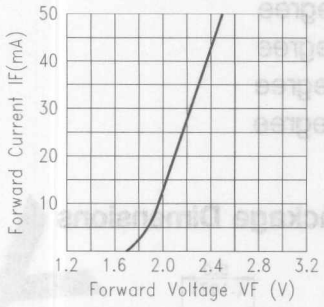


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

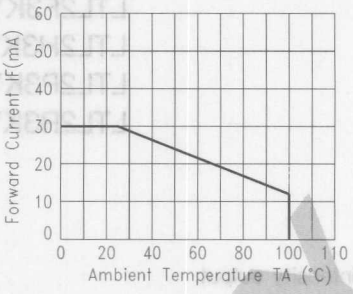


Fig.3 FORWARD CURRENT DERATING CURVE

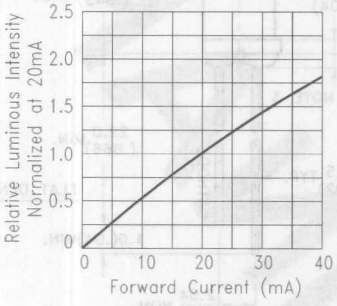


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

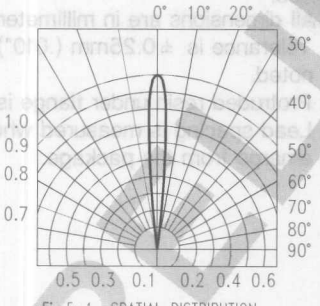


Fig.5-1 SPATIAL DISTRIBUTION

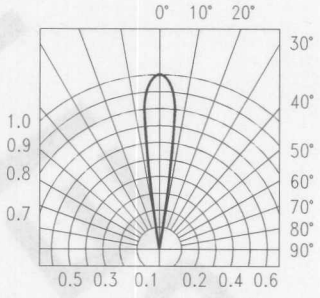


Fig.5-2 SPATIAL DISTRIBUTION

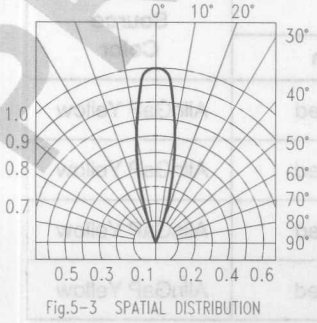


Fig.5-3 SPATIAL DISTRIBUTION

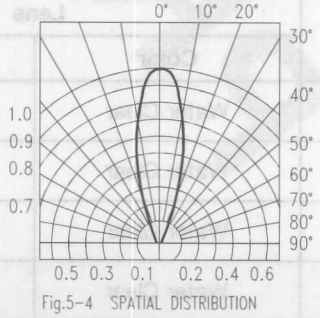


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AS AlInGaP Yellow LED Lamps

LTL2F3KYK 8degree
LTL2H3KYK 15degree
LTL2P3KYK 22degree
LTL2R3KYK 30degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

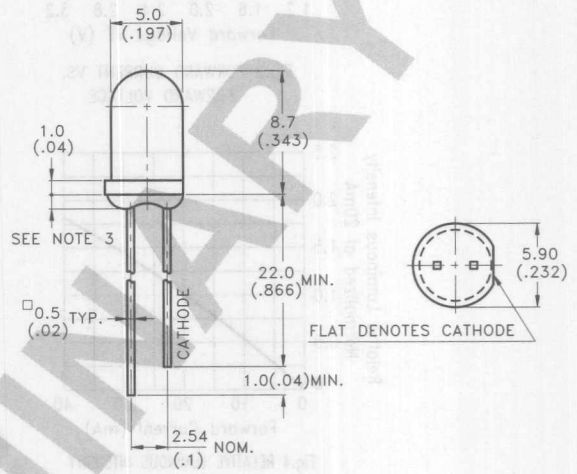
Description

The source color devices are made with Aluminum Indium Gallium Phosphide on Gallium Arsenide light emitting diode.
The devices are made with water clear epoxy package, and with 8, 15, 22 and 30 degrees of viewing angle.

Application

Available for indoor application.
- Message sign.
- Traffic sign.
- Automotive.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2F3KYK	Water Clear	Non-diffused	AlInGaP Yellow
2H3KYK	Water Clear	Non-diffused	AlInGaP Yellow
2P3KYK	Water Clear	Non-diffused	AlInGaP Yellow
2R3KYK	Water Clear	Non-diffused	AlInGaP Yellow

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	75	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	160	mA
Continuous Forward Current	30	mA
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

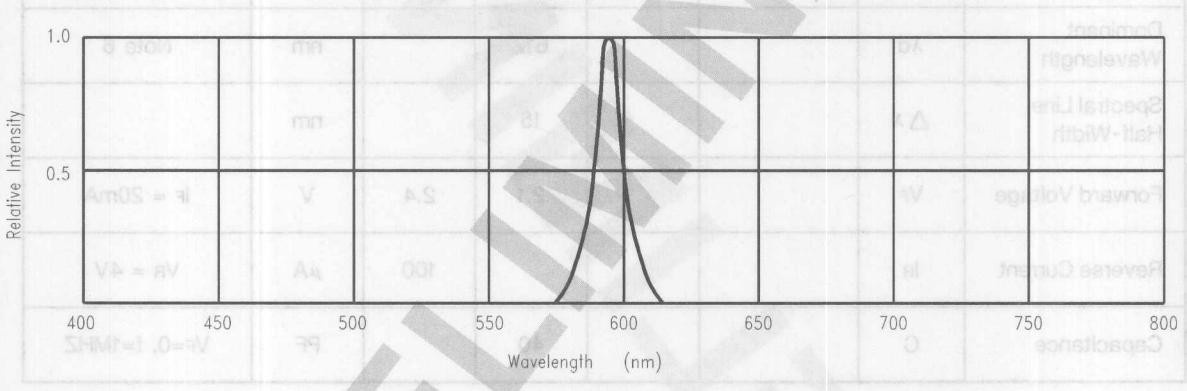


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2F3KYK	1000	3000		mcd	IF=20mA Note 1 Note 2
		2F3KYK-ST	1000		3600		
		2F3KYK-TU	1800		6400		
		2H3KYK	560	1700			
		2H3KYK-RS	560		2000		
		2H3KYK-ST	1000		3600		
		2P3KYK	320	1200			
		2P3KYK-QR	320		1120		
		2P3KYK-RS	560		2000		
		2R3KYK	180	700			
		2R3KYK-PQ	180		640		
		2R3KYK-QR	320		1120		
Viewing Angle	2 θ 1/2	2F3KYK		8		deg	Note 3 (Fig.6)
		2H3KYK		15			
		2P3KYK		22			
		2R3KYK		30			
Peak Emission Wavelength	λP			595		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λd			592		nm	Note 6
Spectral Line Half-Width	△λ			15		nm	
Forward Voltage	VF			2.1	2.4	V	IF = 20mA
Reverse Current	IR				100	μA	VR = 4V
Capacitance	C			40		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

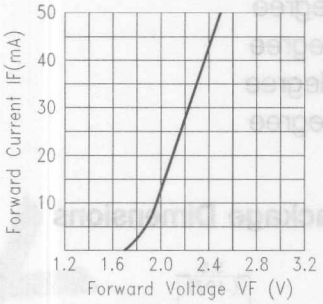


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

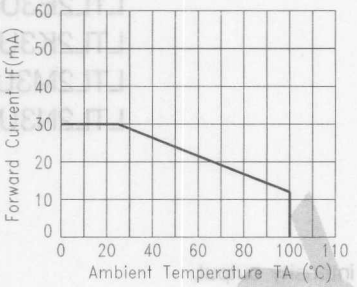


Fig.3 FORWARD CURRENT DERATING CURVE

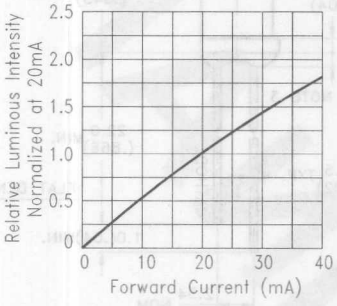


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

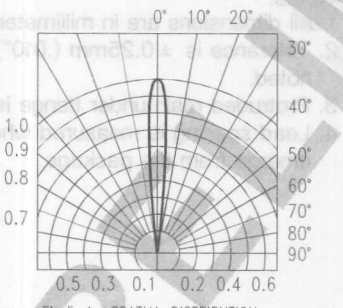


Fig.5-1 SPATIAL DISTRIBUTION

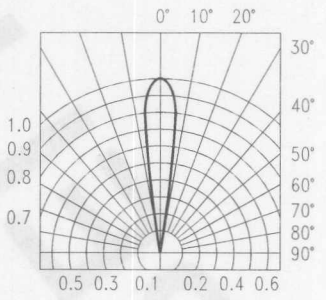


Fig.5-2 SPATIAL DISTRIBUTION

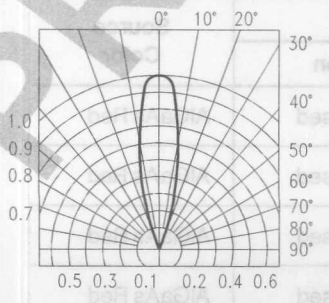


Fig.5-3 SPATIAL DISTRIBUTION

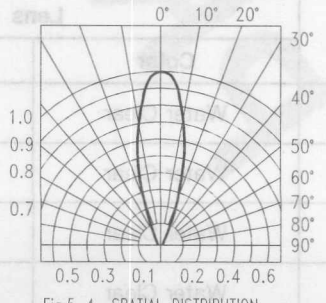


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Ultra Bright AlGaAs Red LED Lamps

LTL2E3URK 8degree
LTL2K3URK 20degree
LTL2M3URK 30degree
LTL2N3URK 40degree

Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Popular T-1 ¾ diameter.

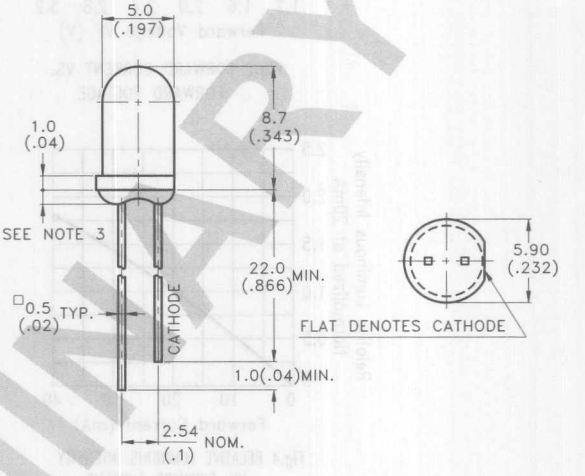
Description

The source color devices are made with high performance Aluminum Gallium Arsenide light emitting diode. The devices are made with water clear epoxy package, and with 8, 20, 30 and 40 degrees of viewing angle.

Application

- Message sign.
- CHMSL

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2E3URK	Water Clear	Non-diffused	AlGaAs Red
2K3URK	Water Clear	Non-diffused	AlGaAs Red
2M3URK	Water Clear	Non-diffused	AlGaAs Red
2N3URK	Water Clear	Non-diffused	AlGaAs Red

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	mA
Continuous Forward Current	40	mA
Derating Linear From 50 ℃	0.5	mA/ ℃
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

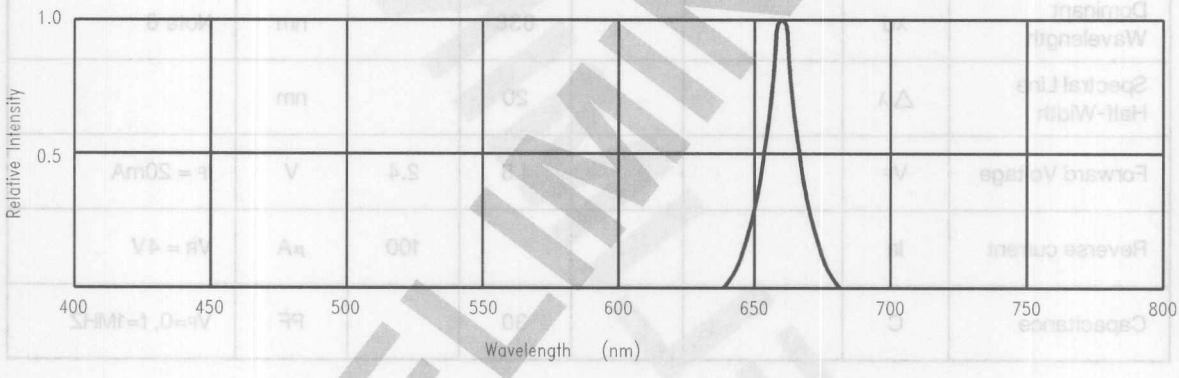


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2E3URK	1000	3000		mcd	IF=20mA
		2E3URK-ST	1000		3600		Note 1
		2E3URK-TU	1800		6400		Note 2
		2K3URK	560	1500			
		2K3KYK-RS	560		2000		
		2K3KYK-ST	1000		3600		
		2M3URK	320	1000			
		2M3URK-QR	320		1120		
		2M3URK-RS	560		2000		
		2N3URK	180	600			
		2N3URK-PQ	180		640		
		2N3URK-QR	320		1120		
Viewing Angle	2 θ 1/2	2E3URK		8		deg	Note 3(FIG.6)
		2K3URK		20			
		2M3URK		30			
		2N3URK		40			
Peak Emission Wavelength	λP			660		nm	Measurement @ peak (FIG.1)
Dominant Wavelength	λd			638		nm	Note 6
Spectral Line Half-Width	△λ			20		nm	
Forward Voltage	VF			1.8	2.4	V	IF = 20mA
Reverse current	IR				100	μA	VR = 4V
Capacitance	C			30		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. θ1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

(25 ℃ Ambient Temperature Unless Otherwise Noted)

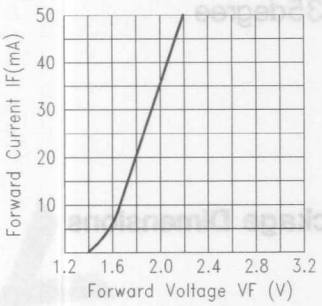


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

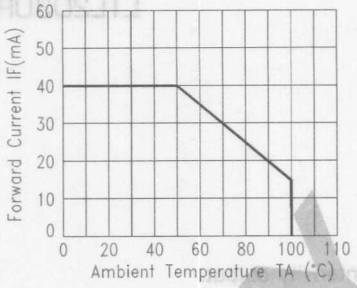


Fig.3 FORWARD CURRENT DERATING CURVE

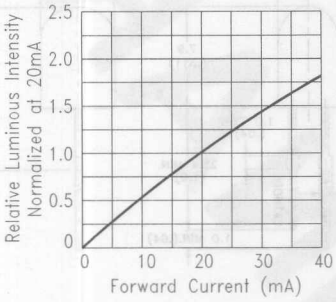


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

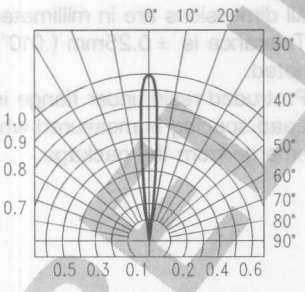


Fig.5-1 SPATIAL DSTRIBUTION

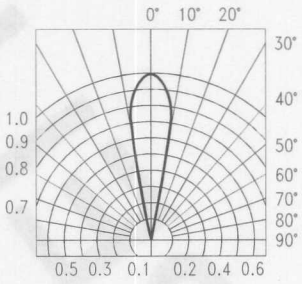


Fig.5-2 SPATIAL DISTRIBUTION

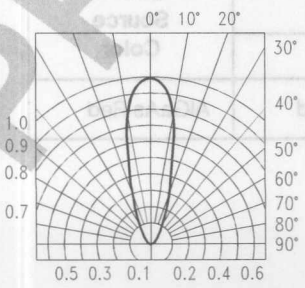


Fig.5-3 SPATIAL DISTRIBUTION

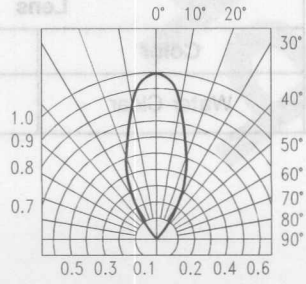


Fig.5-4 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

Oval 5mm Ultra Bright AlGaAS Red LED Lamps

LTL2D3URK 70/35degree

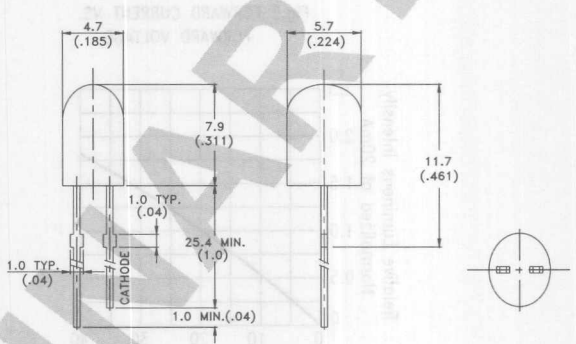
Features

- High luminous intensity output.
- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Widely viewing angle.

Description

The source color device is made with Aluminum Gallium Arsenide light emitting diode.
LTL2D3URK is made with high performance AlGaAs dice.
The devices are made with water clear epoxy package, and with 70/35degrees of viewing angle.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL	Lens		Source Color
	Color	Diffusion	
2D3URK	Water Clear	Non-diffused	AlGaAs Red

PRELIMINARY

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	mA
Continuous Forward Current	40	mA
Derating Linear From 50 ℃	0.5	mA/ ℃
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

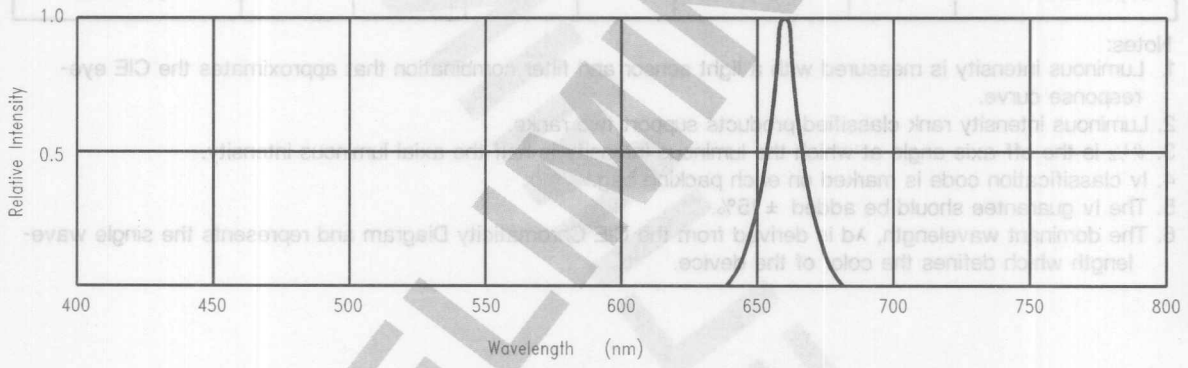


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

PRELIMINARY

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2D3URK 2D3URK-NP 2D3URK-PQ	100 100 180	300	 360 640	mcd	IF=20mA Note 1 Note 2
Viewing Angle	2 θ ½			70/35		deg	Note 3(FIG.6)
Peak Emission Wavelength	λP			660		nm	Measurement @ peak (FIG.1)
Dominant Wavelength	λd			638		nm	Note 6
Spectral Line Half-Width	△λ			20		nm	
Forward Voltage	VF			2.0	2.4	V	IF = 20mA
Reverse current	IR				100	μA	VR = 4V
Capacitance	C			30		PF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ±15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

PRELIMINARY

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

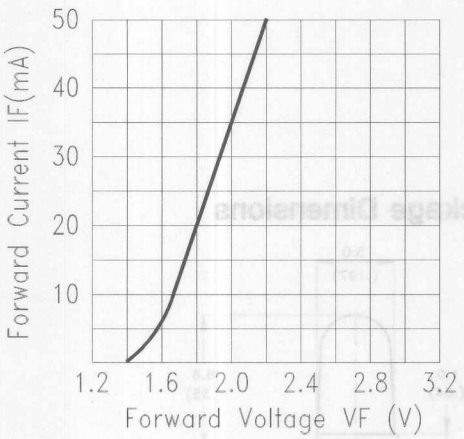


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

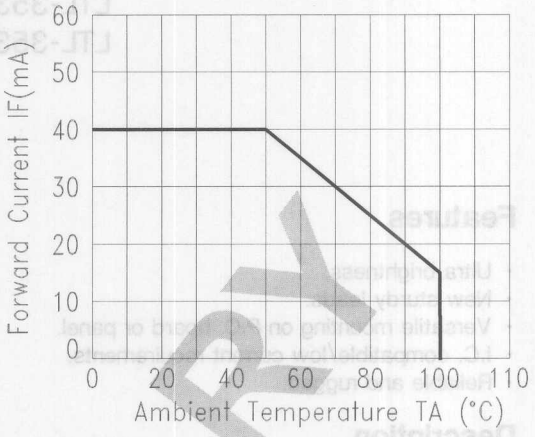


Fig.3 FORWARD CURRENT DERATING CURVE

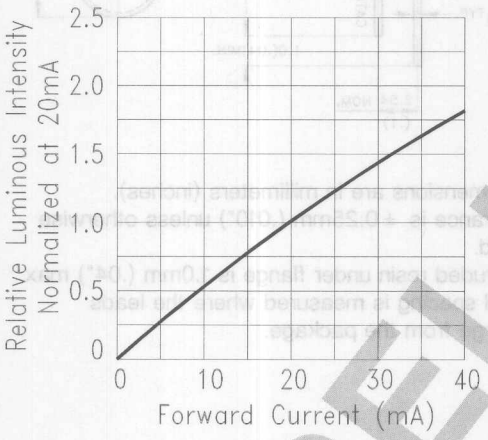


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

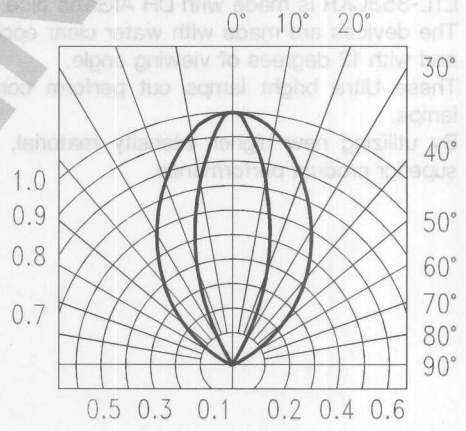


Fig.5 SPATIAL DISTRIBUTION

PRELIMINARY

LITEON

T-1¾ (5mm) Modified Ultra Brigh AlGaAs Red LED Lamps

LTL-353URKR
LTL-353CKR

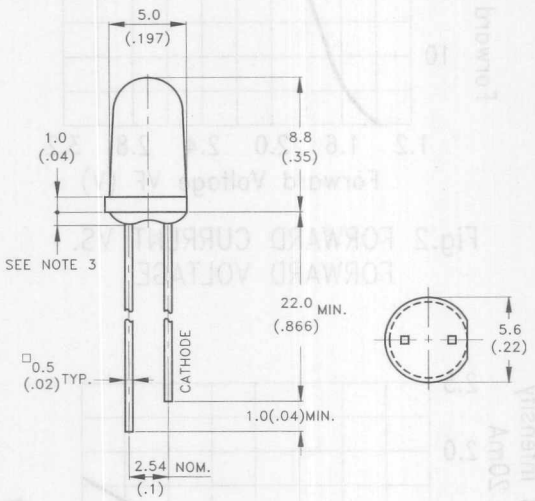
Features

- Ultra brightness.
- New sturdy leads.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Reliable and rugged.

Description

The source color devices are made with Aluminum Gallium Arsenide light emitting diode.
LTL-353URKR is made with high performance AlGaAs dice.
LTL-353CKR is made with DH AlGaAs dice.
The devices are made with water clear epoxy package, and with 12 degrees of viewing angle.
These Ultra bright lamps out perform convential LED lamps.
By utilizing new higher intensity material, we achieve superior product performance.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
353URKR	Water Clear	Non-diffused	AlGaAs Red
353CKR	Water Clear	Non-diffused	DH AlGaAs Red

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	mA
Continuous Forward Current	40	mA
Derating Linear From 50 ℃	0.5	mA/ ℃
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

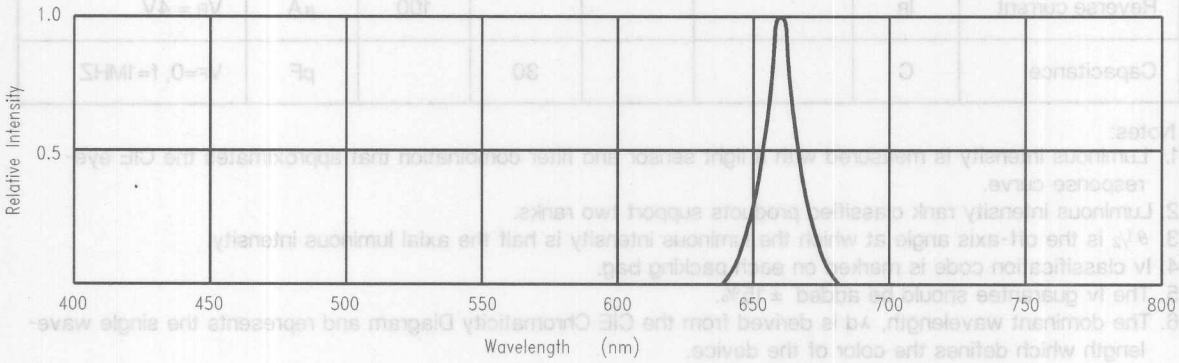


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	353URKR	1000	2300		mcd	IF=20mA
		353URKR-ST	1000		3600		Note 1
		353URKR-TU	1800		6400		Note 2.
		353CKR-H4	700	1000		mcd	IF=20mA
		353CKR-H3	400	700			Note 1
		353CKR-L2	150	300			
Viewing Angle	2 θ 1/2			12		deg	Note 3(FIG.6)
Peak Emission Wavelength	λP			660		nm	Measurement @ peak (FIG.1)
Dominant Wavelength	λd			638		nm	Note 6
Spectral Line Half-Width	△λ			20		nm	
Forward Voltage	VF			1.8	2.4	V	IF = 20mA
Reverse current	IR				100	μA	VR = 4V
Capacitance	C			30		pF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ± 15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

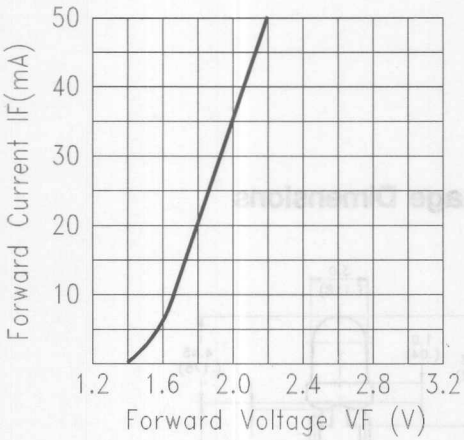


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

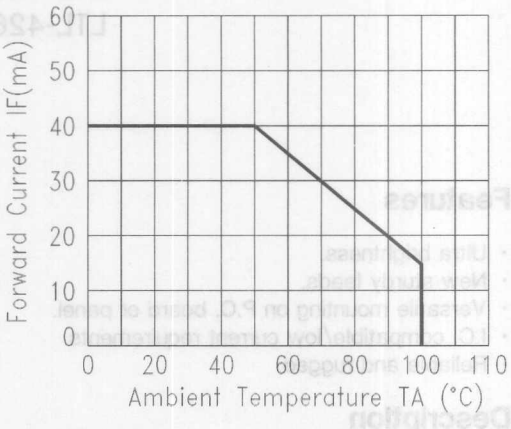


Fig.3 FORWARD CURRENT DERATING CURVE

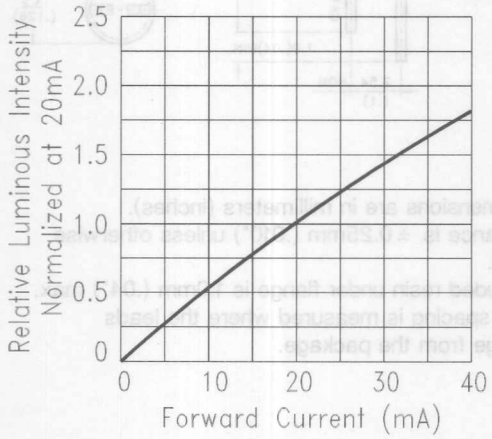


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

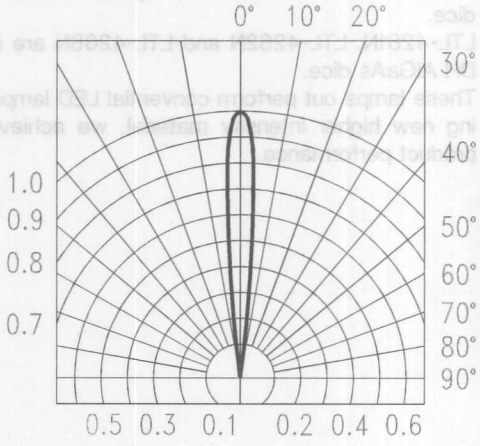


Fig.5 SPATIAL DSTRIBUTION

LITEON

T-1(3mm) Ultra Bright AlGaAs Red LED Lamps

LTL-4266NUR
LTL-4266NR

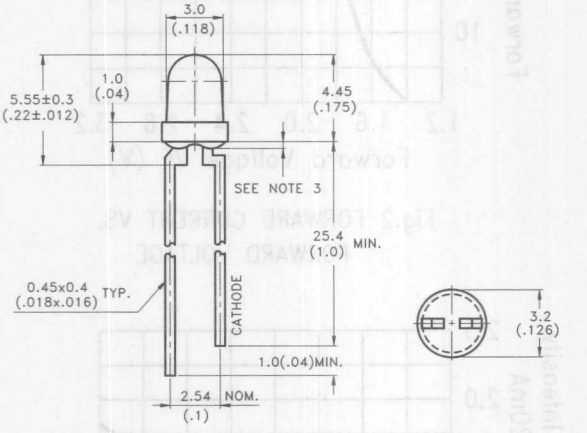
Features

- Ultra brightness.
- New sturdy leads.
- Versatile mounting on P.C. board or panel.
- I.C. compatible/low current requirements.
- Reliable and rugged.

Description

The source color devices are made with Aluminum Gallium Arsenide light emitting diode.
LTL-4266NUR is made with high performance AlGaAs dice.
LTL-4261N, LTL-4262N and LTL-4266N are made with DH AlGaAs dice.
These lamps out perform convential LED lamps.By utilizing new higher intensity material, we achieve superior product performance.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
4266NUR	Water Clear	Non-diffused	AlGaAs Red
4266NR	Water Clear	Non-diffused	DH AlGaAs Red
4262NR	Red	Transparent	DH AlGaAs Red
4261NR	Red	Diffused	DH AlGaAs Red

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	mA
Continuous Forward Current	40	mA
Derating Linear From 50 ℃	0.5	mA/ ℃
Reverse Voltage	4	V
Operating Temperature Range	-40 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(0.063")From Body]	260 ℃ for 5 Seconds	

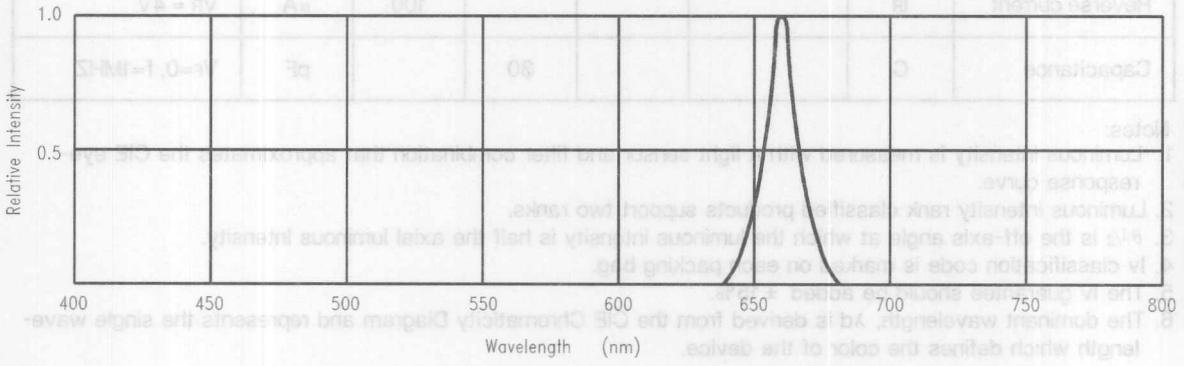


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical/Optical Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	4266NUR	100	500		mcd	IF=20mA Note 1 Note 2.
		4266NR	60	170		mcd	IF=20mA Note 1
		4262NR	40	135			
		4261NR	19	60			
Viewing Angle	2 θ 1/2	4266NUR		35		deg	Note 3(FIG.6)
		4266NR		45			
		4262NR		45			
		4261NR		60			
Peak Emission Wavelength	λP			660		nm	Measurement @ peak (FIG.1)
Dominant Wavelength	λd			638		nm	Note 6
Spectral Line Half-Width	△λ			20		nm	
Forward Voltage	VF			1.8	2.4	V	IF = 20mA
Reverse current	IR				100	μA	VR = 4V
Capacitance	C			30		pF	VF=0, f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. Luminous intensity rank classified products support two ranks.
3. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
4. Iv classification code is marked on each packing bag.
5. The Iv guarantee should be added ± 15%.
6. The dominant wavelength, λd is derived from the CIE Chromaticity Diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

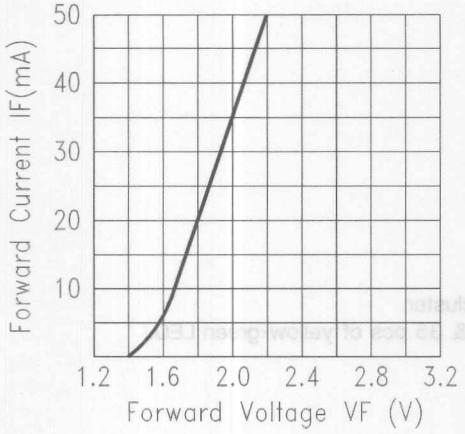


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

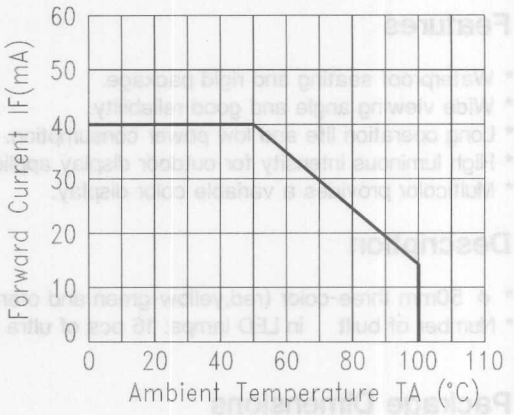


Fig.3 FORWARD CURRENT DERATING CURVE

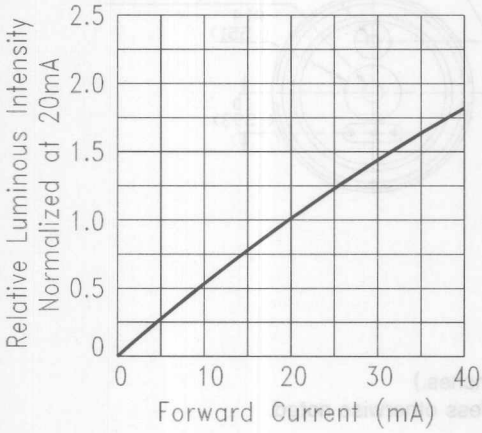


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

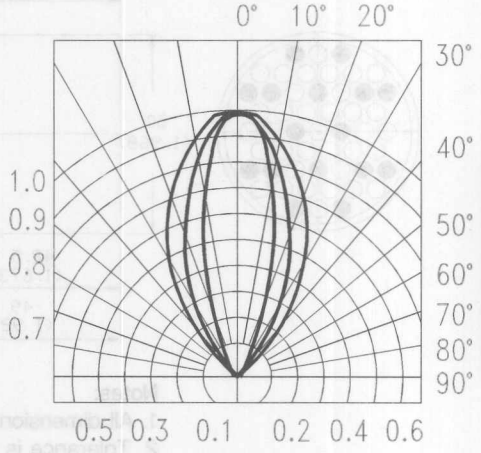


Fig.5 SPATIAL DISTRIBUTION

LITEON

ϕ 50mm LED Cluster Lamp

LTM-9062-1

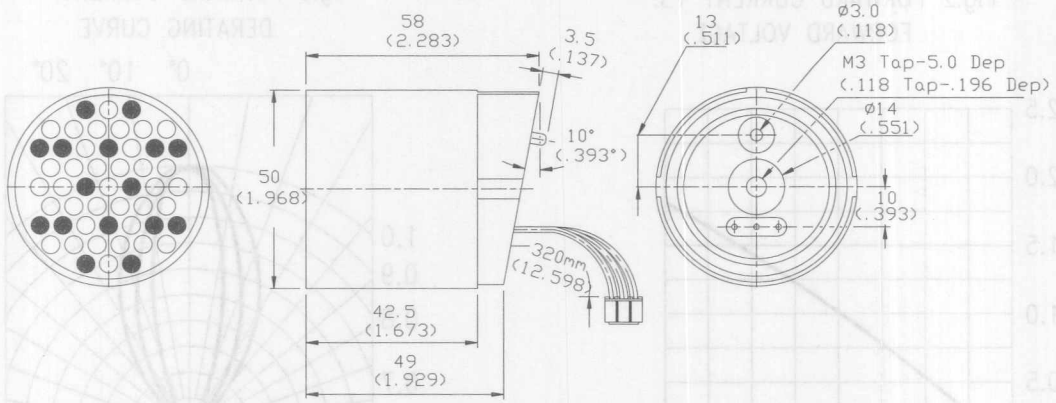
Features

* Waterproof seating and rigid package.
* Wide viewing angle and good reliability.
* Long operation life and low power consumption.
* High luminous intensity for outdoor display applications.
* Multicolor provides a variable color display.

Description

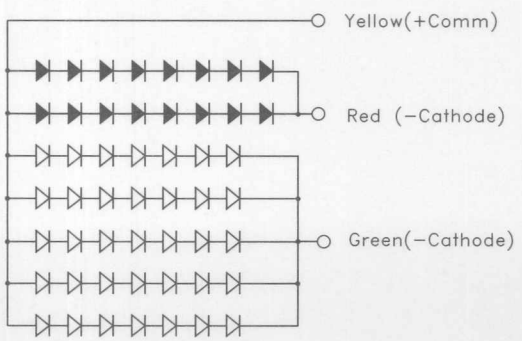
* ϕ 50mm three-color (red,yellow-green and orange) LED lamp cluster.
* Number of built in LED lamps: 16 pcs of ultra bright red LED & 35 pcs of yellow-green LED.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches.)
2. Tolerance is ±0.25mm (.010") unless otherwise noted.

Internal Circuit



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Green	Orange	Unit
Power Dissipation	1.1	2.2	3.3	W
Continuous Forward Current	60	125		mA
Reverse Voltage	40	35		V
Operating Temperature Range	-25 ℃ to +60 ℃			
Storage Temperature Range	-30 ℃ to +80 ℃			

Electrical Characteristics at Ta=25 ℃

Parameter	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Forward Voltage	V_F	Red Green		15.6 15.4		V	I_F=40 mA I_F=100 mA
Reverse Current	I_R	Red Green			100 200	μA	V_R=40 V V_R=35V

Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Peak Wavelength	λ P	Red Green		660 565		nm	I_F = 40mA I_F =100mA
Luminous Intensity	Iv	Red Green Orange		9.0 5.5 14.5		cd	I_F = 40mA I_F =100mA
Viewing Angle	2 θ 1/2	Red Green		36 36		deg	

LITEON

ϕ 30mm LED Cluster Lamp

LTM-9266-1

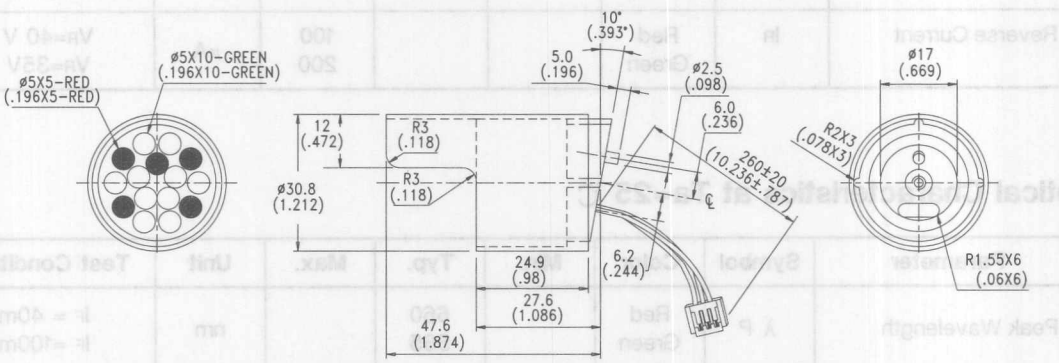
Features

* Waterproof seating and rigid package.
* Wide viewing angle and good reliability.
* Long operation life and low power consumption.
* High luminous intensity for outdoor display applications.
* Multicolor provides a variable color display.
* The direction of the sunshade is adjustable before the cluster lamp mounted on display panel.

Description

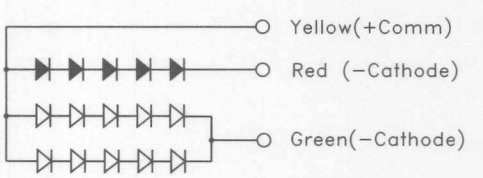
* ϕ 30mm three-color (red,yellow-green and orange) LED lamp cluster.
* Number of built-in LED lamps: 5 pcs of ultra bright red LED & 10 pcs of yellow-green LED.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches.)
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.

Internal Circuit



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Green	Orange	Unit
Power Dissipation	331	644	975	mW
Continuous Forward Current	30	50		mA
Reverse Voltage	25	25		V
Operating Temperature Range	-25 ℃ to +60 ℃			
Storage Temperature Range	-30 ℃ to +80 ℃			

Electrical Characteristics at Ta=25 ℃

Parameter	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Forward Voltage	V_F	Red Green		9.6 11.2		V	I_F=20 mA I_F=40 mA
Reverse Current	I_R	Red Green			100 200	μA	V_R=25 V V_R=25 V

Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Color	Min.	Typ.	Max.	Unit	Test Condition
Peak Wavelength	λ P	Red Green		660 565		nm	I_F = 20mA I_F = 40mA
Luminous Intensity	Iv	Red Green Orange	1.5 0.6 2.1		6.0 2.4 8.4	cd	I_F = 20mA I_F = 40mA
Viewing Angle	θ	Orange	± 25			deg	I_F =60mA, Iv ≧ 1cd.

Typical Electrical / Optical Curves at Ta=25 ℃

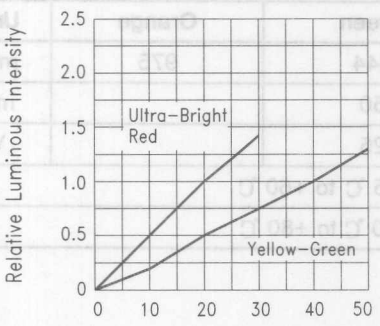


FIG.1 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

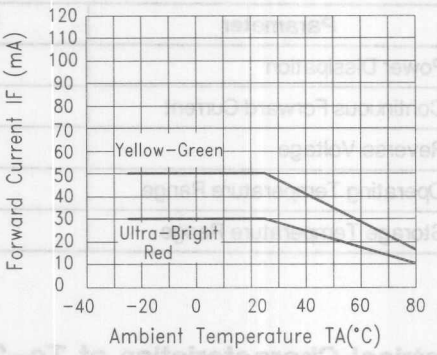


FIG.3 FORWARD CURRENT DERATING CURVE

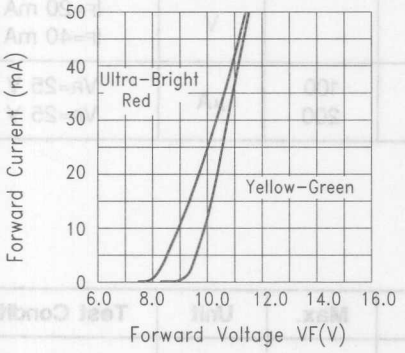


FIG.2 FORWARD CURRENT VS. FORWARD VOLTAGE

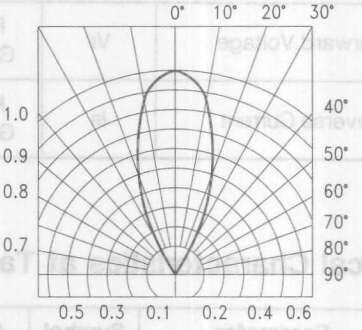


FIG.4 SPATIAL DISTRIBUTION

LITEON

CHMSL

LTM-9466

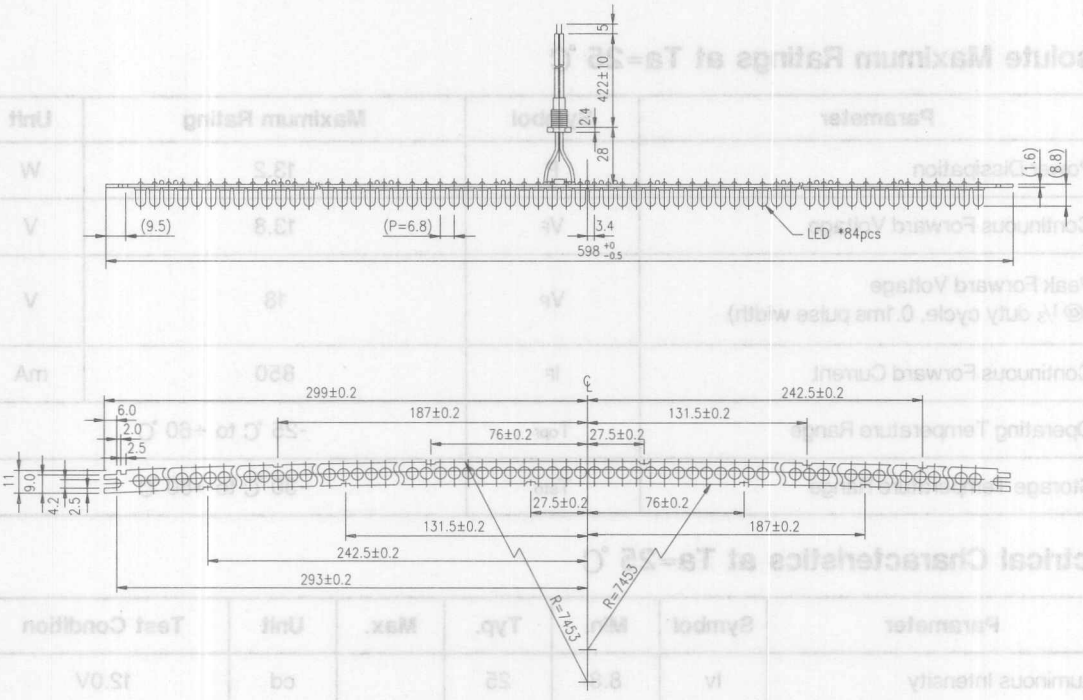
Features

* Wide viewing angle and good reliability.
* Long operation life and low power requirement.
* High luminous intensity.
* High speed response.
* Suitable for multiples operation.

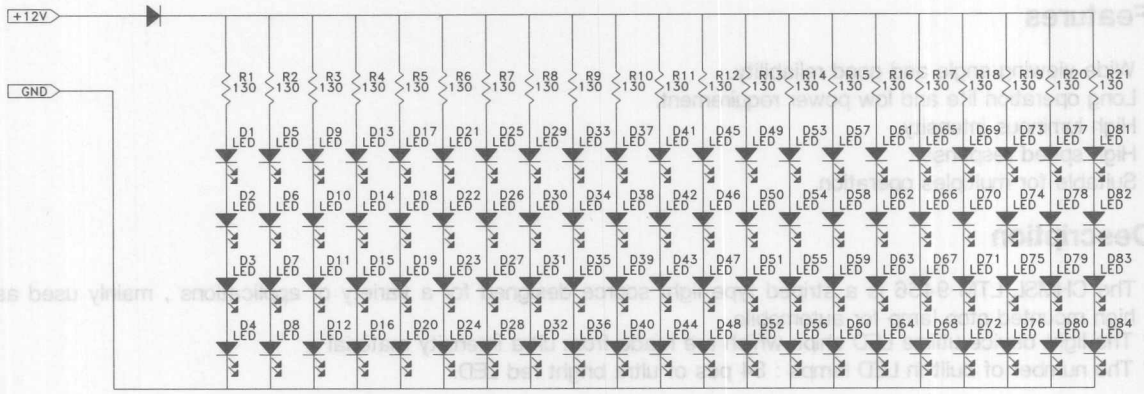
Description

* The CHMSL LTM-9466 is a striped type light source designed for a variety of applications , mainly used as high mounted stop lamp for automobile.
* The light device utilize LED chips which are made from ultra intensity material .
* The number of built-in LED lamps : 84 pcs of ultra bright red LED.

Package Dimensions



Internal Circuit



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Symbol	Maximum Rating	Unit
Power Dissipation	P	13.2	W
Continuous Forward Voltage	V_F	13.8	V
Peak Forward Voltage (@ 1/3 duty cycle, 0.1ms pulse width)	V_P	18	V
Continuous Forward Current	I_F	850	mA
Operating Temperature Range	T_{opr}	-25 ℃ to +60 ℃	
Storage Temperature Range	T_{sto}	-30 ℃ to +80 ℃	

Electrical Characteristics at Ta=25 ℃

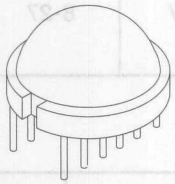
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	I_V	8.8	25		cd	12.0V
Forward Current	I_F		610		mA	V_F=12.0V
Reverse Current	I_R			100	μA	V_R=12.0V
Peak Emission Wavelength	λ P		660		nm	Measurement @peak

8.LED LAMPS

- SELECTION GUIDE 8-1
- CROSS REFERENCE GUIDE 8-11
- BIG LED LAMPS 8-19
- LOW CURRENT LED LAMPS 8-23
- SIDE LOOKING LAMPS 8-27
- STANDARD LED LAMPS 8-30
- SPECIAL LED LAMPS 8-60
- DUAL COLOR LED LAMPS 8-84
- TAPE AND REEL
  — RADIAL TAPE AND REEL 8-156
- CIRCUIT BOARD INDICATORS AND PANEL MOUNTED INDICATORS 8-160

Selection Guide

· Big LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @60mA	Typical Viewing Angle 2θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	12 Pin DIP. Centers 20 φ	LTJ-811HR	Hi. Eff Red (635 nm)	Diffused	25.0 mcd	180 °	2.0V	8-19
		LTJ-811G	Green (565 nm)	Diffused	25.0 mcd	180 °	2.1V	
		LTJ-811Y	Yellow (585 nm)	Diffused	25.0 mcd	180 °	2.1V	

· Low Current LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @2mA	Typical Viewing Angle 2θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	T-1 Standard 1" Lead 3 φ	LTL-4221NLC	Hi. Eff Red (635 nm)	Diffused	2.5 mcd	60 °	1.7V	8-23
		LTL-4231NLC	Green (565 nm)	Diffused	1.1 mcd	60 °	1.9V	
		LTL-4251NLC	Yellow (585 nm)	Diffused	1.1 mcd	60 °	1.8V	
	T-1 3/4 Standard 1" Lead 5 φ	LTL-307ELC	Hi. Eff Red (635 nm)	Diffused	3.7 mcd	50 °	1.7V	
		LTL-307GLC	Green (565 nm)	Diffused	3.7 mcd	50 °	1.9V	
		LTL-307YLC	Yellow (585 nm)	Diffused	3.7 mcd	50 °	1.8V	

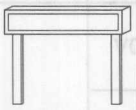
Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Side Looking Lamp

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	VF Typ. @20mA	Page No.
	Package	Part No.	Color (λ P)	Lens			
	Side Looking Lamp	LTL-96RGK	Green (565nm)	Water Clear	10	4.4 V	8-27

· Standard LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color (λ P)	Lens				
	T-1 Standard 1" Lead 3 ϕ	LTL-1CHA	Amber (610nm)	Diffusion	12.6 mcd	60 °	2.1V	8-30
		LTL-1CHAE		Transparent	29 mcd	45 °		
		LTL-1CHE	Hi.Eff.Red (630nm)	Diffusion	19 mcd	60 °	2.0V	
		LTL-1CHEE		Transparent	19 mcd	45 °		
		LTL-1CHG	Green (565nm)	Diffusion	12.6mcd	60 °	2.1V	
		LTL-1CHGE		Transparent	40 mcd	45 °		
		LTL-1CHP	Bright Red (697nm)	Diffusion	4.4 mcd	60 °	2.1V	
		LTL-1CHPE		Transparent	8.7 mcd	45 °		
		LTL-1CHR	Red (655nm)	Diffusion	1.1 mcd	60 °	1.7V	
		LTL-1CHRE		Transparent	3.7 mcd	45 °		
		LTL-1CHY	Yellow (585m)	Diffusion	8.7 mcd	60 °	2.1V	
		LTL-1CHYE		Transparent	40 mcd	45 °		

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Standard LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	T-1 Standard 1" Lead 3 φ	LTL-4201N	Red (655 nm)	Diffused	1.1 mcd	60 °	1.7V	8-36
		LTL-4206N		Water Clear	3.7 mcd	45 °		
		LTL-4211N	Bright Red (697 nm)	Diffused	4.4 mcd	60 °	2.1V	
		LTL-4212N		Transparent	5.6 mcd	45 °		
		LTL-4221N	Hi. Eff Red (635nm)	Diffused	8.7 mcd	60 °	2.0V	
		LTL-4222N		Transparent	29 mcd	45 °		
		LTL-4231N	Green (565 nm)	Diffused	12.6 mcd	60 °	2.1V	
		LTL-4232N		Transparent	40 mcd	45 °		
		LTL-4236N		Water Clear	29 mcd	45 °		
		LTL-4251N	Yellow (585 nm)	Diffused	5.6 mcd	60 °	2.1V	
		LTL-4252N		Transparent	19 mcd	45 °		
		LTL-4256N		Water Clear	19 mcd	45 °		
		LTL-4291N	Orange (630 nm)	Diffused	8.7 mcd	60 °	2.0V	
		LTL-4292N		Transparent	19 mcd	45 °		
		LTL-4296N		Water Clear	29 mcd	45 °		
	T-1 3/4 Standard 1" Lead 5 φ	LTL-307R	Red (655 nm)	Diffused	1.7 mcd	50 °	1.7V	8-42
		LTL-307RE		Transparent	3.7 mcd	40 °		
		LTL-307P	Bright Red (697 nm)	Diffused	5.6 mcd	50 °	2.1V	
		LTL-307PE		Transparent	8.7 mcd	40 °		
		LTL-307E	Hi. Eff Red (635nm)	Diffused	19.0 mcd	50 °	2.0V	
		LTL-307EE		Transparent	90 mcd	40 °		
		LTL-307G	Green (565 nm)	Diffused	19.0 mcd	50 °	2.1V	
		LTL-307GE		Transparent	60.0 mcd	40 °		
		LTL-307Y	Yellow (585 nm)	Diffused	29.0 mcd	50 °	2.1V	
		LTL-307YE		Transparent	40.0 mcd	40 °		

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Standard LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λP)	Lens				
	2.0mm x 5.0mm Rectangular Bars Flangeless	LTL-433P	Bright Red (697 nm)	Diffused	1.1 mcd	140 °	2.1V	8-48
		LTL-433G	Green (565 nm)	Diffused	3.7 mcd	140 °	2.1V	
		LTL-433Y	Yellow (585 nm)	Diffused	3.7 mcd	140 °	2.1V	
		LTL-433EA	Orange (630 nm)	Diffused	3.7 mcd	140 °	2.0V	
	1.0mm x 5.0mm Rectangular Bars	LTL-3218A	Bright Red (697 nm)	Diffused	1.1 mcd	106 °	2.1V	8-52
		LTL-3238A	Green (565 nm)	Diffused	3.7 mcd	106 °	2.1V	
		LTL-3258A	Yellow (585 nm)	Diffused	2.5 mcd	106 °	2.1V	
		LTL-3278A	Amber (600 nm)	Diffused	2.5 mcd	106 °	2.1V	
	2.5mm x 7.1mm Rectangular Bars	LTL-3213A	Bright Red (697 nm)	Diffused	0.7 mcd	130 °	2.0V	8-56
		LTL-3223A	Hi. Eff Red (635 nm)	Diffused	6.3 mcd @ 20mA	130 °	2.1V	
		LTL-3233A	Green (565 nm)	Diffused	6.3 mcd @ 20mA	130 °	2.1V	
		LTL-3253A	Yellow (585 nm)	Diffused	1.7 mcd	130 °	2.1V	
		LTL-3293A	Orange (630 nm)	Diffused	8.2 mcd @ 20mA	130 °	2.0V	

· Special LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λP)	Lens				
	3.2mm x 5.6mm Reflector Cap Rectangular Bars	LTL-33221AA	Hi.Eff.Red (635 nm)	Diffused	5.6 mcd	100 °	2.0V	8-60
		LTL-33231AA	Green (565 nm)	Diffused	5.6 mcd	100 °	2.1V	
		LTL-33251AA	Yellow (585 nm)	Diffused	8.7 mcd	100 °	2.1V	

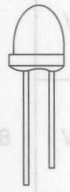
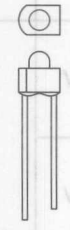
Notes:

* $\theta 1/2$ is the off-axis angle at which the luiminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Special LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	T-1 3/4 Low Profile 5 ϕ	LTL-5224	Hi. Eff Red (635 nm)	Transparent	29 mcd	44 °	2.0V	8-64
		LTL-5234	Green (565 nm)	Transparent	40 mcd	44 °	2.1V	
		LTL-5254	Yellow (585 nm)	Transparent	12.6 mcd	44 °	2.1V	
	Dot point 1.8 ϕ	LTL-7D9P	Birght Red (697 nm)	Diffused	3.7 mcd	38 °	2.1V	8-68
		LTL-7D9E	Hi. Eff Red (635 nm)	Diffused	12.6 mcd	38 °	2.0V	
		LTL-7D9L	Green (565 nm)	Diffused	8.7 mcd	38 °	2.1V	
		LTL-7D9Y	Yellow (585 nm)	Diffused	12.6 mcd	38 °	2.1V	
	Panel Dot Indicators	LTL-1214A	Bright Red (697 nm)	Diffused	1.1 mcd	120 °	2.1V	8-72
		LTL-1234A	Green (565 nm)	Diffused	1.7 mcd	120 °	2.1V	
		LTL-1254A	Yellow (585 nm)	Diffused	3.7 mcd	120 °	2.1V	
		LTL-1294A	Orange (630 nm)	Diffused	2.5 mcd	120 °	2.0V	

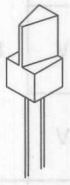
Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Special LED Lamps

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ ½ *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	Arrow Head Pointers	LTL-8212A	Birght Red (697 nm)	Diffused	0.7 mcd	100 °	2.1V	8-76
		LTL-8222A	Hi. Eff. Red (635 nm)	Diffused	2.5 mcd	100 °	2.0V	
		LTL-8232A	Green (565 nm)	Diffused	2.5 mcd	100 °	2.1V	
	Cylindrical 1" Lead 3 ϕ	LTL-2211AT	Bright Red (697 nm)	Diffused	1.1 mcd	180 °	2.1V	8-80
		LTL-2231AT	Green (565 nm)	Diffused	3.7 mcd	180 °	2.1V	
		LTL-2251AT	Yellow (585 nm)	Diffused	2.5 mcd	180 °	2.1V	
		LTL-2291AT	Orange (630 nm)	Diffused	2.5 mcd	180 °	2.0V	

Notes:

* θ ½ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Dual Color LED Lamp

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	T-1 Bi-Polar Standard Lamp	LTL-10CEJ	Hi. Eff. Red (635 nm) 2pcs	White Diffused	12.6 mcd	72 °	2.0V	8-84
		LTL-10CGJ	Green (565 nm) 2pcs	White Diffused	12.6 mcd	72 °	2.1V	8-87
		LTL-10CYJ	Yellow (585 nm) 2pcs	White Diffused	8.7 mcd	72 °	2.1V	8-90
	T-1 Bi-Color Standard Lamp	LTL-10CDJ	Green / Yellow	White Diffused	12.6 mcd / 8.7 mcd	72 °	2.1V / 2.1V	8-93
		LTL-10CHJ	Green / Orange	White Diffused	12.6 mcd / 8.7 mcd	72 °	2.1V / 2.0V	8-96
	T-1 Bi-Polar Standard Lamp	LTL-14CYJ	Yellow (585 nm) 2pcs	White Diffused	8.7 mcd	80 °	2.1V	8-99
	T-1 Bi-Color Standard Lamp	LTL-14CDJ	Green / Yellow	White Diffused	12.6 mcd / 8.7 mcd	80 °	2.1V / 2.1V	8-102
		LTL-14CHJ	Green / Orange	White Diffused	4.8 mcd / 4.8 mcd	200 °	2.1V / 2.1V	8-105

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Dual Color LED Lamp

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ ½ *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	T-1 ¾ Bi-Polar Standard Lamp	LTL-298EJ	Hi. Eff. Red (635 nm) 2pcs	White Diffused	19 mcd	50 °	2.0V	8-108
		LTL-298GJ	Green (565 nm) 2pcs	White Diffused	19 mcd	50 °	2.1V	8-111
		LTL-298YJ	Yellow (585 nm) 2pcs	White Diffused	12.6 mcd	50 °	2.1V	8-114
	T-1 ¾ Bi-Color Standard Lamp	LTL-298DJ	Green	White Diffused	19 mcd	50 °	2.1V	8-117
			Yellow		12.6 mcd		2.1V	
		LTL-298VJ	Green	White Diffused	19 mcd	50 °	2.1V	8-120
			Red		2.5 mcd		1.7V	
		LTL-298WJ	Green	White Diffused	19 mcd	50 °	2.1V	8-123
			Orange		19 mcd		2.0V	
		LTL-293SJ	Green	White Diffused	40 mcd	60 °	2.1V	8-126
			GaAlAs Red		90 mcd		1.8V	
	T-1 ¾ Dual Color Indicator	LTL-30EDJ	Green	White Diffused	29 mcd	30 °	2.1V	8-129
			Yellow		29 mcd		2.1V	
		LTL-30EFJ	Green	White Diffused	29 mcd	30 °	2.1V	8-132
			Bright Red		3.7 mcd		2.1V	
		LTL-30EHJ	Green	White Diffused	29 mcd	30 °	2.1V	8-135
			Orange		40 mcd		2.0V	
	T-1 ¾ Bi-Polar Indicator	LTL-30EG	Green (565 nm) 2pcs	Green Diffused	29 mcd	30 °	2.1V	8-138

Notes:

* θ ½ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Selection Guide

· Dual Color LED Lamp

Outline	Device		Description		Luminous Intensity Iv Typ. @20mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	Dual Color Indicator 2.0mm x 5.0mm	LTL-58EHJ	Green Orange	White Diffused	8.7 mcd 5.6 mcd	100 °	2.1V 2.0V	8-141
		LTL-58EFJ	Green Bright Red	White Diffused	8.7 mcd 1.1 mcd	100 °	2.1V 2.1V	8-144
	Dual Color Indicator 1.0mm x 5.0mm	LTL-7AEFJ	Green Bright Red	White Diffused	5.6 mcd 0.8 mcd	120 °	2.1V 2.1V	8-147
		LTL-7AEDJ	Green Yellow	White Diffused	5.6 mcd 5.6 mcd	120 °	2.1V 2.1V	8-150
	Dual Color Indicator 3.0mm x 5.0mm	LTL-7BEHJ	Green Orange	White Diffused	5.6 mcd 5.6 mcd	100 °	2.1V 2.0V	8-153

Notes:

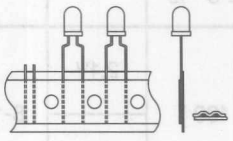
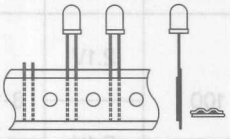
* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

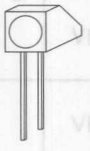
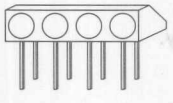
Selection Guide

· Tape And Reel

Raidial Tape And Reel

Outline	Option Code	Description	Page No.
	.001 .011 .021 .031 .041 .051	5mm(0.197")Preformed Leads With -001 : 2.5mm(0.1") -011 : 4.0mm(0.157") -021 : 7.5mm(0.295") -031 : 10.0mm(0.394:) -041 : 6.5mm(0.256") -051 : 5.8mm(0.228") from Seating Plane to Lamp Bottom.	8-156
	.002 .012 .022	2.54mm(0.1")Straight Leads With -002 : 18mm(0.709") -012 : 22mm(0.866") -022 : 26mm(1.024") from Feed Hole to Lamp Bottom.	8-156

· LED Circuit Board And Panel Mounted Indicators

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2 *	VF Typ. @20mA	Page No.
	Package	Part No.	Color** (λ P)	Lens				
	Logic status Indicators Holder with LTL-10200W Lamp series	LTL-503-11	Red (655 nm)	Diffused	1.1 mcd	60 °	1.7V	8-160
		LTL-533-11	Green (565 nm)	Diffused	40 mcd	60 °	2.1V	
		LTL-553-11	Yellow (585 nm)	Diffused	12.6 mcd	60 °	2.1V	
		LTL-503-14	Red (655 nm)	Diffused	1.1 mcd	60 °	1.7V	
		LTL-533-14	Green (565 nm)	Diffused	40 mcd	60 °	2.1V	
		LTL-553-14	Yellow (585 nm)	Diffused	12.6 mcd	60 °	2.1V	

Notes:

* $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

** Peak Emission wavelength (nm).

Cross Reference Guide for:

H.P/TELEFUNKEN/SIEMENS/MATSUSHITA/ROHM/SHARP/STANLEY/QTC/ LED Lamps

In order to designate the similarity between the other manufacturers' device and the nearest LITON equivalent. This guide has been included a letter code system to cover it.

Code Definitions:

A — LITON device is electrically and mechanically equivalent.
B — Minor electrical differences exist.
C — Minor mechanical differences exist.
D — Significant electrical differences exist.
E — Significant mechanical differences exist.

Since Optoelectronics is a relatively young industry, it is possible that different devices offered by two or more manufacturers will satisfy the requirements of one application. Therefore, slight mechanical or electrical variations should not disqualify the nearest equivalent.

The data contained in this guide is believed to be accurate. However, no responsibility is assumed by TAIWAN LITON ELECTRONIC CO., LTD. for the use of this data in actual circuit design.

Cross Reference Guide

H.P.(Hewlett Packard) Equivalent LED Lamps

H.P. Part No.	LITON Part No.	Code
HLMP-0300/0301	LTL-3233A	A
HLMP-0400/0401	LTL-3253A	A
HLMP-0503/0504	LTL-3233A	A
HLMP-1000/1002	LTL-4201N	A
HLMP-1300/1301/1302	LTL-4221N	A
HLMP-1321	LTL-4222N	A
HLMP-1400/1401/1402	LTL-4251N	A
HLMP-1421	LTL-4252N	A
HLMP-1503/1523	LTL-4231N	A
HLMP-1521	LTL-4232N	A
HLMP-1700	LTL-4221NLC	A
HLMP-3002/3003	LTL-307R	A
HLMP-3300/3301/3762	LTL-307E	A

H.P. Part No.	LITON Part No.	Code
HLMP-3315/3316	LTL-307EE	A
HLMP-3350/3351	LTL-5233	A
HLMP-3400/3401/3862	LTL-307Y	A
HLMP-3450/3451	LTL-5253	A
HLMP-3502/3507/3962	LTL-307G	A
HLMP-3517/3519	LTL-307GE	A
HLMP-3553/3554	LTL-5233	A
HLMP-4700	LTL-307ELC	A
HLMP-5000	LTL-503-11	E
HLMP-5030	LTL-503-11	E
HLMP-5040	LTL-503-11	E
HLMP-5050	LTL-503-11	E
HLMP-D400/D401	LTL-307EA	A

Cross Reference Guide

SIEMENS Equivalent LED Lamps

SIEMENS Part No.	LITON Part No.	Code
LDR-1101/1102/1103	LTL-4201N	A
LDH-1111/1112/1113	LTL-4221N	A
LDY-1131/1132/1133	LTL-4251N	A
LDG-1151/1152/1153	LTL-4231N	A
LDR-1201	LTL-10203N	C
LDG-1231	LTL-10233N	C
LDY-1251	LTL-10253N	C

SIEMENS Part No.	LITON Part No.	Code
LDR-3701/3702/3703	LTL-23221AL	A
LDY-3801/3802/3803	LTL-23251AL	A
LDG-3901/3902/3903	LTL-23231AL	A
LDR-5101/5102/5103	LTL-307R	A
LDH-5121/5122/5123	LTL-307E	A
LDY-5161/5162/5163	LTL-307Y	A
LDG-5171/5172/5173	LTL-307G	A

Cross Reference Guide

TELEFUNKEN Equivalent LED Lamps

TELEFUNKEN Part No.	LITON Part No.	Code
TLUR-2400/2401	LTL-7D9R	C
TLUO-2400/2401	LTL-7D9EA	C
TLUY-2400/2401	LTL-7D9Y	C
TLUG-2400/2401	LTL-7D9G	C
TLSR-3200/3201	LTL-2201AT	E
TLSO-3200/3201	LTL-2291AT	E
TLSY-3200/3201	LTL-2251AT	E
TLSG-3200/3201	LTL-2231AT	E
TLSR-3300/3301	LTL-56MR	E
TLSO-3300/3301	LTL-56MEA	E
TLSY-3300/3301	LTL-56MY	E
TLSG-3300/3301	LTL-56MG	E
TLHR-4200/4201/4205	LTL-4202N	A
TLHY-4200/4201/4203	LTL-4252N	A
TLHG-4200/4201/4202 /4203/4205	LTL-4232N	A
TLHR-4400/4401/4402 /4403/4405	LTL-4201N	A
TLHY-4400/4401/4402 /4403/4405	LTL-4251N	A
TLHG-4400/4401/4402 /4403/4405	LTL-4231N	A
TLSR-5100/5101	LTL-23201AL	C
TLSO-5100/5101	LTL-23291AL	C
TLSY-5100/5101	LTL-23251AL	C

TELEFUNKEN Part No.	LITON Part No.	Code
TLSG-5100/5101	LTL-23231AL	A
TLSR-5300/5301	LTL-9204A	A
TLSO-5300/5301	LTL-9294A	A
TLSY-5300/5301	LTL-9254A	A
TLSG-5300/5301	LTL-9234A	A
TLAR-5400/5401	LTL-6203LN	A
TLAO-5400/5401	LTL-6293LN	A
TLAY-5400/5401	LTL-6253LN	A
TLAG-5400/5401	LTL-6233LN	A
TLUR-6400/6401	LTL-307R	A
TLUO-6400/6401	LTL-307EA	A
TLUY-6400/6401	LTL-307Y	A
TLUG-6400/6401	LTL-307G	A
TLHR-6200/6201/6202/ 6203/6205	LTL-4224	A
TLHY-6200/6201/6202/ 6203/6205	LTL-4254	A
TLHG-6200/6201/6202/ 6203/6205	LTL-4234	A
TLHR-6400/6401/6402/ 6403/6405	LTL-307E	A
TLHY-6400/6401/6402/ 6403/6405	LTL-307Y	A
TLEG-6400/6401/6402/ 6403/6405	LTL-307G	A

Cross Reference Guide

MATSUSHITA/PANASONIC Equivalent LED Lamps

MATSUSHITA Part No.	LITON Part No.	Code
LN2TRPHL/21RPH	LTL-307P	A
LN21RCPH/21RCPHL	LTL-307PE	A
LN21CAL (U)	LTL-4268-H3	A
LN217RP	LTL-3215S	C
LN222RP	LTL-1214A	A
LN224RP	LTL-3218A	C
LN226RP	LTL-8212A	C
LN242RP	LTL-433P	A
LN245RP	LTL-23216A	B/E
LN31GPHL/31GPH	LTL-307G	A
LN31CPHL/31GCPH	LTL-307GE	A
LN317GP	LTL-3235S	C

MATSUSHITA Part No.	LITON Part No.	Code
LN322GP	LTL-1234A	A
LN324GP	LTL-3238A	C
LN326GP	LTL-8232A	C
LN342GP	LTL-433G	A
LN345GP	LTL-23236A	B/E
LN41YPH/41YPHL	LTL-307Y	A
LN417YP	LTL-3255S	C
LN422YP	LTL-1254A	A
LN424YP	LTL-3278A	C
LN442YP	LTL-433Y	A
LN445YP	LTL-23276A	B/E
LN81RPHL/81RPH	LTL-307E	A
LN81RCPHL/81RCPH	LTL-307EE	A

Cross Reference Guide

ROHM Equivalent LED Lamps

ROHM Part No.	LITON Part No.	Code
SLR-34YT	LTL-4256	A
SLR-34MT	LTL-4236	A
SLR-56VR/SLH-56VR	LTL-307E	B
SLR-56VC	LTL-307EE	B
SLR-56DU/SLH-56DC	LTL-307EA	A
SLR-56YY/SLH-56YY	LTL-307Y	A
SLR-56MG/SLH-56MG	LTL-307G	A
SLR-56MC	LTL-307GE	A

ROHM Part No.	LITON Part No.	Code
SPR-56MVW	LTL-52EA	A
SLV-56VC	LTL-2224RT	A
SLV-56VT	LTL-2294WC	A
SLV-56DC	LTL-2224RT	A
SLV-56DT	LTL-2294WC	A
SLV-56YC	LTL-2254YT	A
SLV-56YT	LTL-2254WC	A
SLV-56MC	LTL-2234GT	A
SLV-56MT	LTL-2234WC	A
SLR-80VR	LTL-327HR	A
SLR-80MG	LTL-327G	A
SLR-80YY	LTL-327Y	A
LSR-80DU	LTL-327EA	A

Cross Reference Guide

SHARP Equivalent LED Lamps

SHARP Part No.	LITON Part No.	Code
GL5AR1	LTL-203	A
GL5PR1	LTL-213	A
GL5PR5	LTL-307P	A
GL5PR6	LTL-307PE	A
GL5PR27	LTL-2214RT	A
GL5HD5	LTL-307E	A
GL5HD27	LTL-2224PT	A
GL5EG5	LTL-307G	A
GL5HY1	LTL-253	A
GL5HY5	LTL-307Y	A
GL5HY27	LTL-2254YT	A
GL5PR21	LTL-4214	B
GL5PR24	LTL-4218	B
GL5HD21	LTL-4224	B
GL5EG21	LTL-4234	B
GL5EG24	LTL-4238	B
GL5HY21	LTL-4254	B
GL9PR26	LTL-433P	C
GL9HD26	LTL-433HR	C

SHARP Part No.	LITON Part No.	Code
GL9HY26	LTL-433Y	C
GL9PR10	LTL-13218A	A
GL9HD10	LTL-13228A	A
GL9H10	LTL-13258A	A
GLPR23	LTL-13219B	B/C
GL9HD23	LTL-13229B	B/C
GL9EG23	LTL-13239B	B/C
GL9HY23	LTL-13259B	B/C
GL9PR24	LTL-3218A	C
GL9HD24	LTL-3228A	C
GL9EG24	LTL-3238A	C
GL9HY24	LTL-3258A	C
GL9PR25	LTL-3217A	A
GL9EG25	LTL-3237A	A
GL9HY25	LTL-3257A	A
GL9PR40	LTL-23216A	E
GL9HY40	LTL-23256A	E
GL9PR4	LTL-9213A	A
GL9HD4	LTL-9223A	A
GL9EG4	LTL-9233A	A
GL9HY4	LTL-9253A	A
GL9PR6	LTL-8212A	A
GL9HD6	LTL-8222A	A
GL9HG6	LTL-8232A	A
GL9HY6	LTL-8252A	A

Cross Reference Guide

STANLEY Equivalent LED Lamps

STANLEY Part No.	LITON Part No.	Code
LVR3378S	LTL-4221NLC	C
LPG3378S	LTL-4231NLC	B/C
MPR5364X	LTL-307P	C
MPR5374X	LTL-307PE	C
PY5362X	LTL-2234WC	B/C
PR5362X	LTL-2214WC	B/C
VRPG5641K	LTL-32D1EG	C
VRPG5614S	LTL-52EG	A
PR5351K	LTL-433P	A
VR5351K	LTL-433HR	A
PG5351KY	LTL-433G	A
AY5351K	LTL-433Y	A

QTC Equivalent LED Lamps

QTC Part No.	LITON Part No.	Code
MV5454A/MV6454A	LTL-307GE	B
MV5154A/MV6154A	LTL-307EA	B
MV5754A/MV6754A	LTL-307E	B
MV53123	LTL-433Y	A
MV54123	LTL-433G	A
MV57123	LTL-433HR	A
HLMP-0400	LTL-3253A	B
HLMP-0503/0504	LTL-3233A	B
HLMP-0300/0301	LTL-3223A	B

LITEON

0.8"(20mm) Big LED Lamps

LTJ-811 HR/811G/811Y

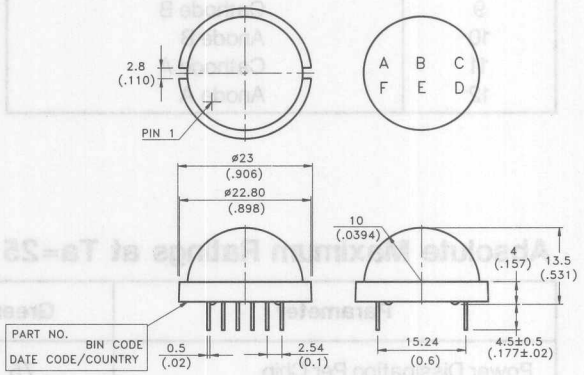
Features

- 0.8 inch (20.0mm) diameter big lamp.
- Choices of three bright colors-green/yellow/high efficiency red.
- Wide viewing angle.
- Graphic stacking allowable.
- High luminous intensity.
- Low power requirement.
- Solid state reliability.
- Categorized for luminous intensity.
- Excellent ON-OFF contrast.
- Suitable for multiplex operation.
- Easy mounting on P.C. board or sockets.

Description

The LTJ-811 series big lamp are sphere light sources designed for a variety of application where a large, bright source of light is required. The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. The green devices have green diffused lens color. The yellow devices have yellow diffused lens color. The high efficiency red devices have red diffused lens color.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches.)
   Tolerance are: ± 0.25mm (.010") unless otherwise noted.

Devices

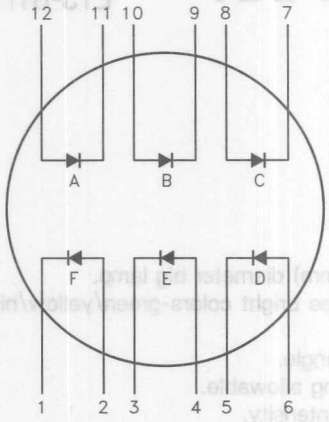
Part No. LTJ-			Description
Green	Yellow	Hi.Eff. Red	
811G	811Y	811HR	Universal, Sphere Lens

LED LAMPS

Pin Connection

Pin No.	Connection
1	Cathode F
2	Anode F
3	Cathode E
4	Anode E
5	Cathode D
6	Anode D
7	Cathode C
8	Anode C
9	Cathode B
10	Anode B
11	Cathode A
12	Anode A

Internal Circuit Diagram



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Yellow	Hi.-Eff. Red	Unit
Power Dissipation Per Chip	75	60	75	mW
Peak Forward Current Per Chip (1/10 Duty Cycle,0.1ms Pulse Width)	100	80	100	mA
Continuous Forward Current Per Chip	25	20	25	mA
Derating Linear From 25 ℃ Per Chip	0.33	0.27	0.33	mA/ ℃
Reverse Voltage Per Chip	5	5	5	V
Operating Temperature Range	-35 ℃ to + 85 ℃			
Storage Temperature Range	-35 ℃ to + 85 ℃			
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical / Optical Characteristics at Ta = 25 ℃

LTJ-811Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Lamp	Iv	10	25		mcd	IF=60mA
Peak Emission Wavelength Per Lamp	λ P		585		nm	IF=120mA
Spectral Line Half-Width Per Lamp	Δ λ		35		nm	IF=120mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V

LTJ-811HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Lamp	Iv	10	25		mcd	IF=60mA
Peak Emission Wavelength Per Lamp	λ P		635		nm	IF=120mA
Spectral Line Half-Width Per Lamp	Δ λ		40		nm	IF=120mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V

LTJ-811G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Lamp	Iv	11	25		mcd	IF=60mA
Peak Emission Wavelength Per Lamp	λ P		565		nm	IF=120mA
Spectral Line Half-Width Per Lamp	Δ λ		30		nm	IF=120mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

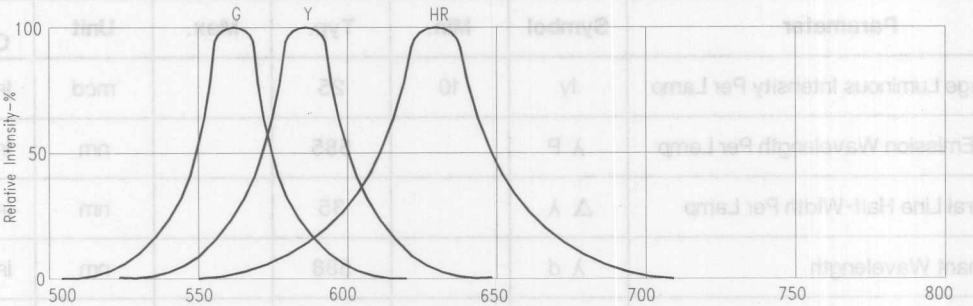


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

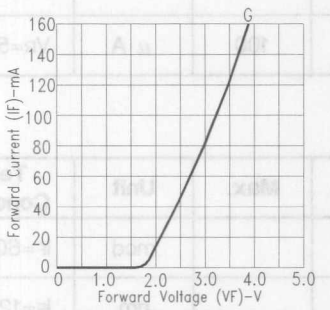


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

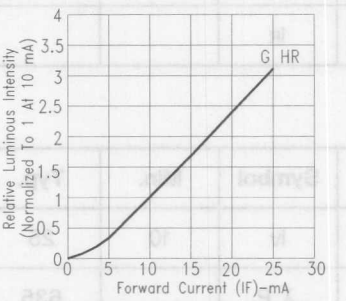


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

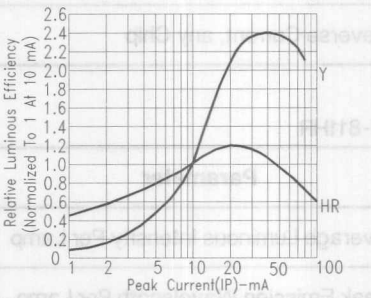


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

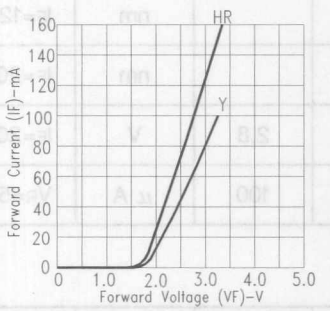


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

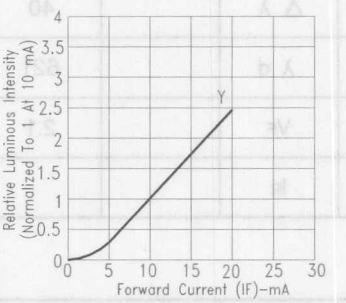


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

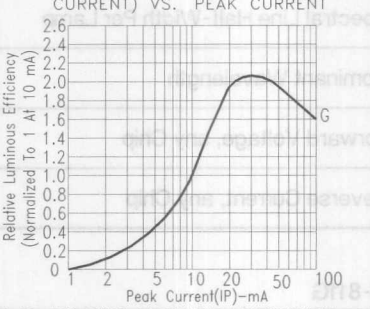


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

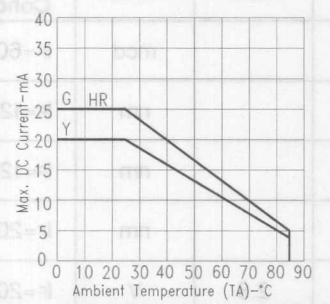


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

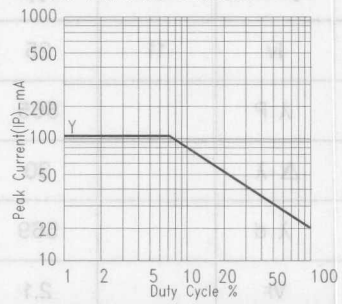


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

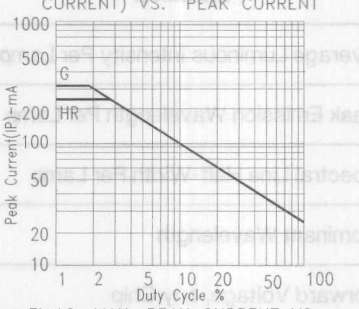


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN Y=YELLOW HR=HI.-EFF

T-1(3mm) Low Current LED Lamps

LTL-4221NLC/307ELC Low Current HI.Eff.Red
LTL-4231NLC/307GLC Low Current Green
LTL-4251NLC/307YLC Low Current Yellow

Feature

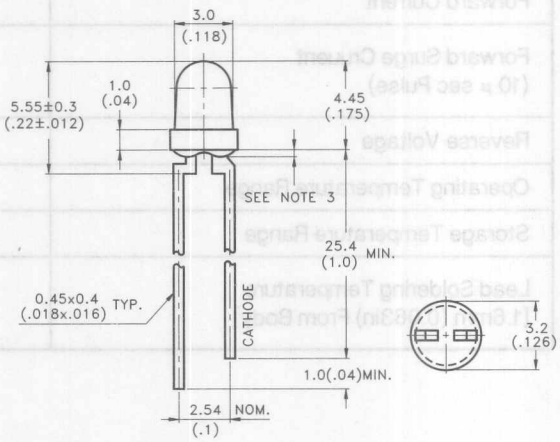
- Low power consumption
- High efficiency
- CMOS/MOS compatible
- TTL compatible
- Wide viewing angle

Description

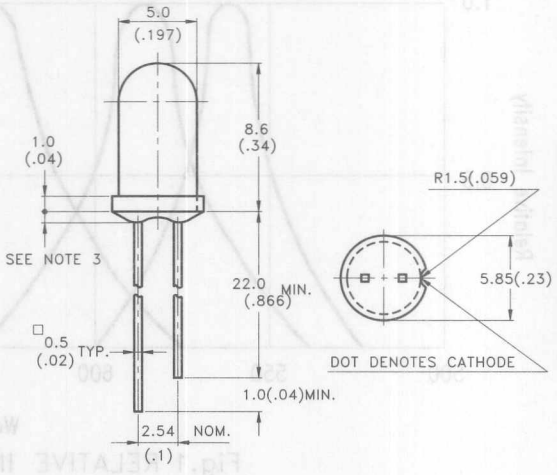
These tinted diffused LED lamps were designed and optimized specifically for low DC current operation. Luminous intensity and forward voltage are tested at 2 mA to assure consistent brightness at TTL output current levels.

Package Dimensions

LTL-42x1NLC Series



LTL-307xLC Series



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (0.10") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
4221NLC	Red	Diffused	Hi. Eff. Red
4231NLC	Green	Diffused	Green
4251NLC	Yellow	Diffused	Yellow

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
307ELC	Red	Diffused	Hi. Eff. Red
307GLC	Green	Diffused	Green
307YLC	Yellow	Diffused	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Maximum Rating		Unit
Power Dissipation Tamb ≤ 90 ℃	Hi. Eff. Red Green Yellow	20 20 20	mW
Forward Current	7		mA
Forward Surge Cruuent (10 μ sec Pulse)	500		mA
Reverse Voltage	5		V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

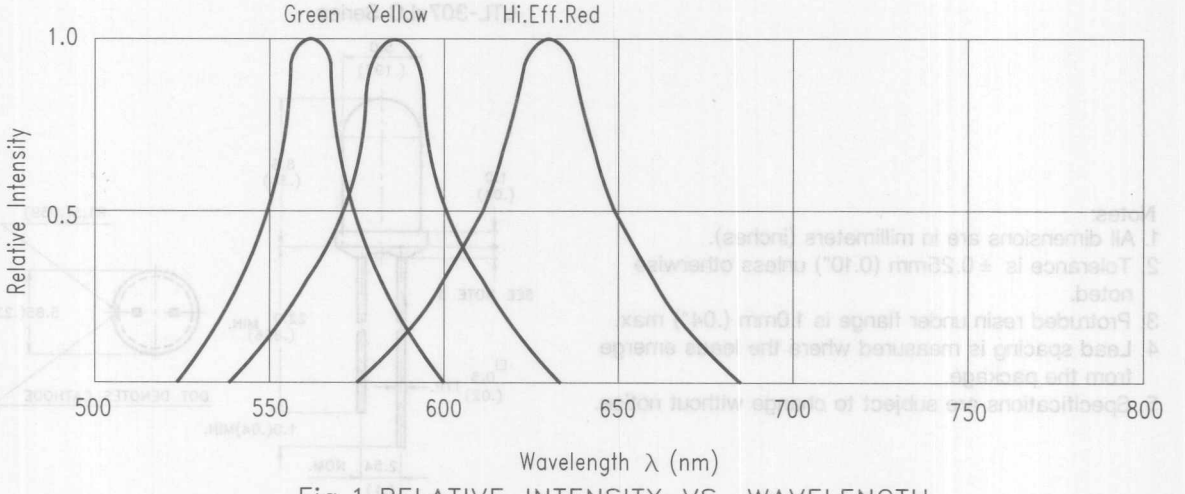


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical /Opitcal Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	4221NLC 4231NLC 4251NLC	0.7 0.4 0.4	2.5 1.1 1.1		mcd	IF = 2mA Note 1
Viewing Angle	2 θ 1/2	4221NLC 4231NLC 4251NLC		60		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	4221NLC 4231NLC 4251NLC		635 565 585		nm	Measurement @ Peak (Fig.1)
Dominant Wavelength	λd	4221NLC 4231NLC 4251NLC		621 569 588		nm	Note 3
Spectral Line Half-Width	△λ	4221NLC 4231NLC 4251NLC		40 30 35		nm	
Forware Voltage	VF	4221NLC 4231NLC 4251NLC		1.7 1.9 1.8	2.2 2.2 2.7	V	IF = 2mA
Reverse Current	IR	4221NLC 4231NLC 4251NLC			10 10 10	μA	VR = 5V

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

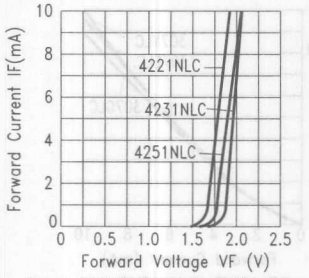


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

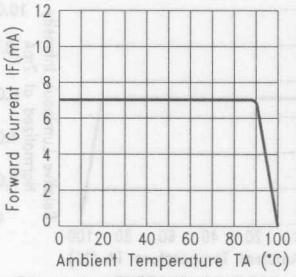


Fig.3 FORWARD CURRENT DERATING CURVE

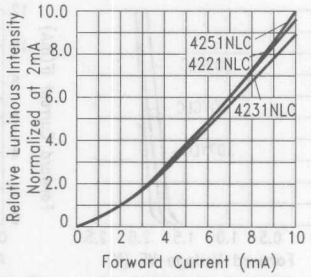


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

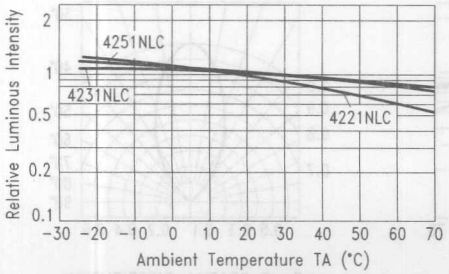


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

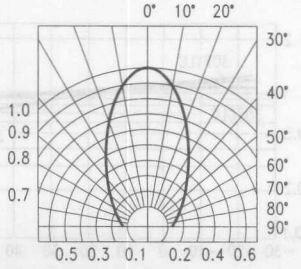


Fig.6 SPATIAL DISTRIBUTION

Electrical /Opitcal Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	307ELC 307GLC 307YLC	1.1 1.1 1.1	3.7 3.7 3.7		mcd	IF = 2mA Note 1
Viewing Angle	2 θ 1/2	307ELC 307GLC 307YLC		50		deg	Note 2 (Fig.11)
Peak Emission Wavelength	λP	307ELC 307GLC 307YLC		635 565 585		nm	Measurement @ Peak (Fig.1)
Dominant Wavelength	λd	307ELC 307GLC 307YLC		621 569 588		nm	Note 3
Spectral Line Half-Width	△ λ	307ELC 307GLC 307YLC		40 30 35		nm	
Forware Voltage	VF	307ELC 307GLC 307YLC		1.7 1.9 1.8	2.2 2.2 2.7	V	IF = 2mA
Reverse Current	IR	307ELC 307GLC 307YLC			10 10 10	μA	VR = 5V

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.

2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

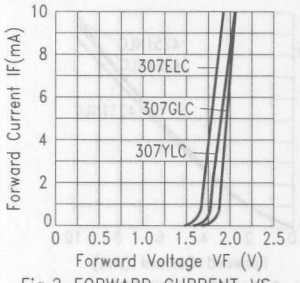


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

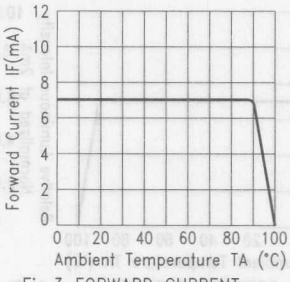


Fig.3 FORWARD CURRENT DERATING CURVE

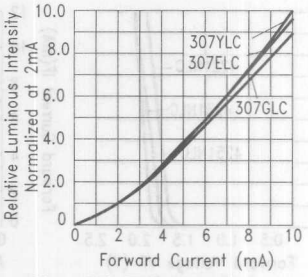


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

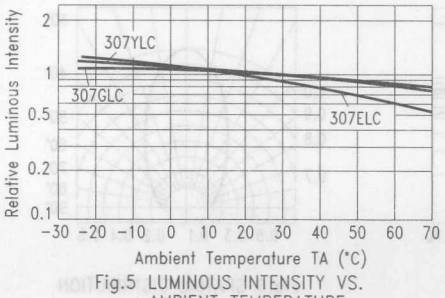


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

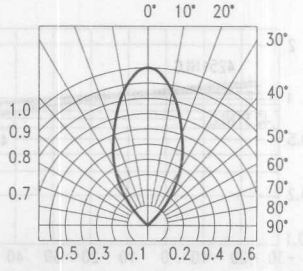


Fig.6 SPATIAL DISTRIBUTION

LITEON

Side Looking Lamp

LTL-96RGK Green

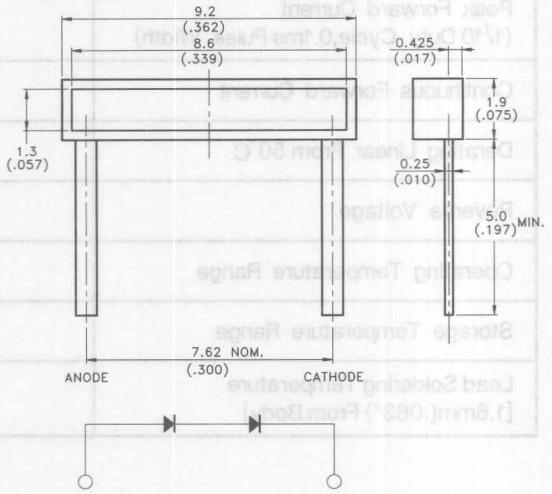
Features

- Low power consumption.
- Most suitable for use LCD back light.
- Excellent uniformity of light emittance.
- I.C. compatible.

Description

The green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") MAX.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
96RGK	Water Clear	Non-diffused	Green

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle,0.1ms Pulse Width)	120	mA
Continuous Forward Current	30	mA
Derating Linear From 50 ℃	0.6	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃	
Storage Temperature Range	-55 ℃ to + 100 ℃	
Lead Soldering Temperature [1.6mm(.063") From Body]	260 ℃ for 5 seconds	

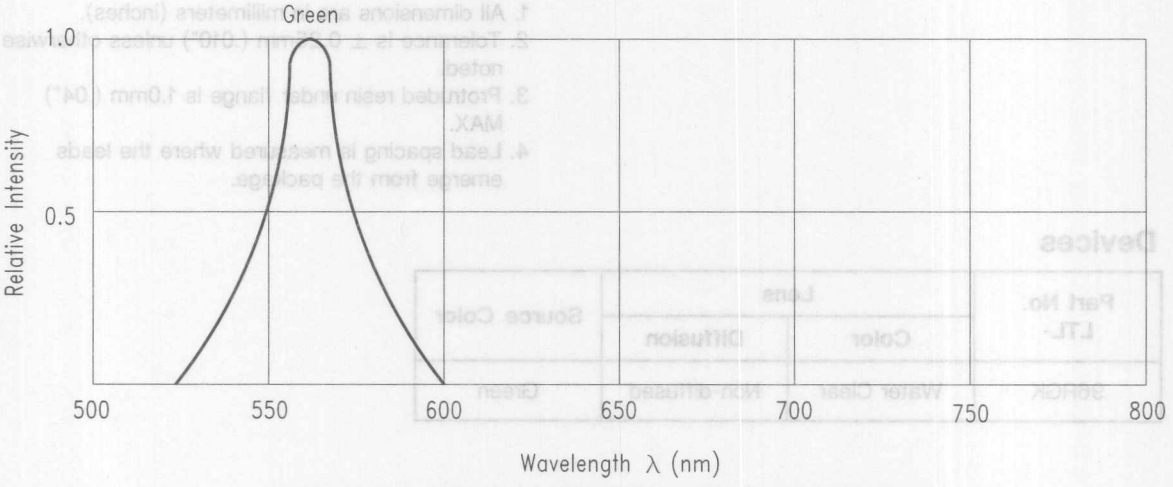


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	96RGK	2.0	10		mcd	IF=10mA Note 1
Peak Emission Wavelength	λ P	96RGK		565		nm	Measurement @ peak (Fig.1)
Dominant Wavelength	λ d	96RGK		569		nm	Note 2
Spectral Line Half-Width	Δ λ	96RGK		30		nm	
Forward Voltage	VF	96RGK		4.4	5.6	V	IF=20mA
Reverse Current	IR	96RGK			100	μ A	VR=5V
Capacitance	C	96RGK		35		PF	VF=0 , f=1MHZ

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.

2. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

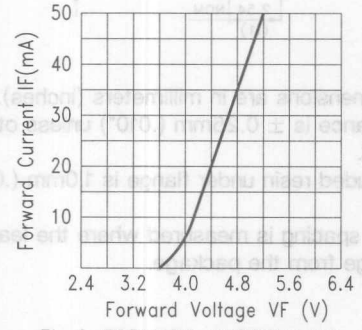


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

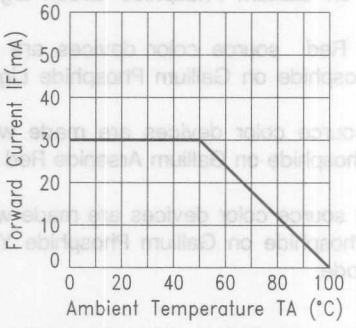


Fig.3 FORWARD CURRENT DERATING CURVE

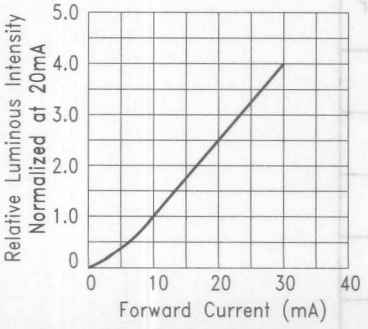


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

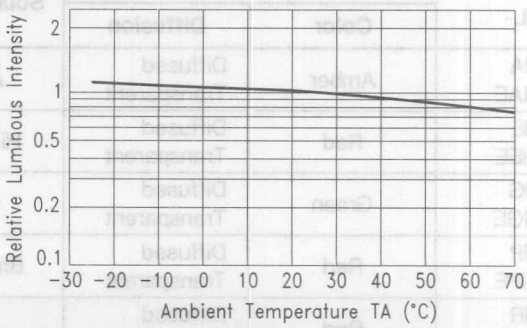


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

T-1(3mm) Solid State Lamps

LITEON

LTL-1CHA / 1CHAE Amber
LTL-1CHE / 1CHEE High Efficiency Red
LTL-1CHG / 1CHGE Green
LTL-1CHP / 1CHPE Bright Red
LTL-1CHR / 1CHRE Red
LTL-1CHY / 1CHYE Yellow

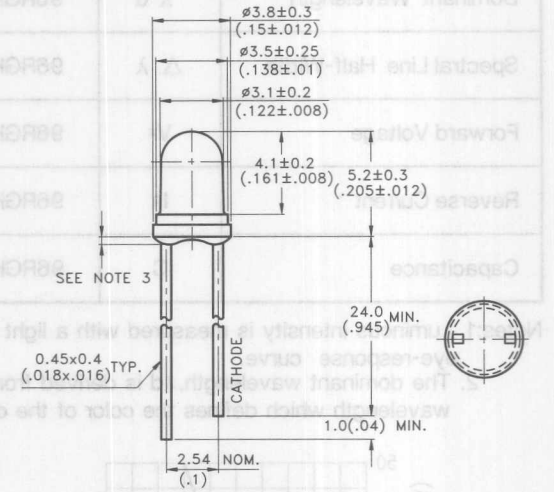
Features

- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. Board or panel.
- I.C. compatible/low current requirements.
- 3.1mm diameter package.

Description

The Amber source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Amber Light Emitting Diode.
The High Efficiency Red source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Light Emitting Diode.
The Red source color devices are made with Gallium Arsenide Phosphide on Gallium Arsenide Red Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") MAX.
4. Lead spacing is measured where the leads emerge from the package.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
1CHA 1CHAE	Amber	Diffused Transparent	Amber
1CHE 1CHEE	Red	Diffused Transparent	Hi.Eff.Red
1CHG 1CHGE	Green	Diffused Transparent	Green
1CHP 1CHPE	Red	Diffused Transparent	Bright Red
1CHR 1CHRE	Red	Diffused Transparent	Red
1CHY 1CHYE	Yellow	Diffused Transparent	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Amber	Hi.Eff. Red	Green	Bright Red	Red	Yellow	Unit
Power Dissipation	60	100	100	40	80	60	mW
Peak Forward Current (1/10 Duty Cycle,0.1ms Pulse Width)	80	120	120	60	200	80	mA
Continuous Forward Current	20	30	30	15	40	20	mA
Derating Linear From 50 ℃	0.25	0.4	0.4	0.2	0.5	0.25	mA/ ℃
Reverse Voltage	5	5	5	5	5	5	V
Operating Temperature Range	-55 ℃ to + 100 ℃						
Storage Temperature Range	-55 ℃ to + 100 ℃						
Lead Soldering Temperature [1.6mm(.063") From Body]	260 ℃ for 5 seconds						

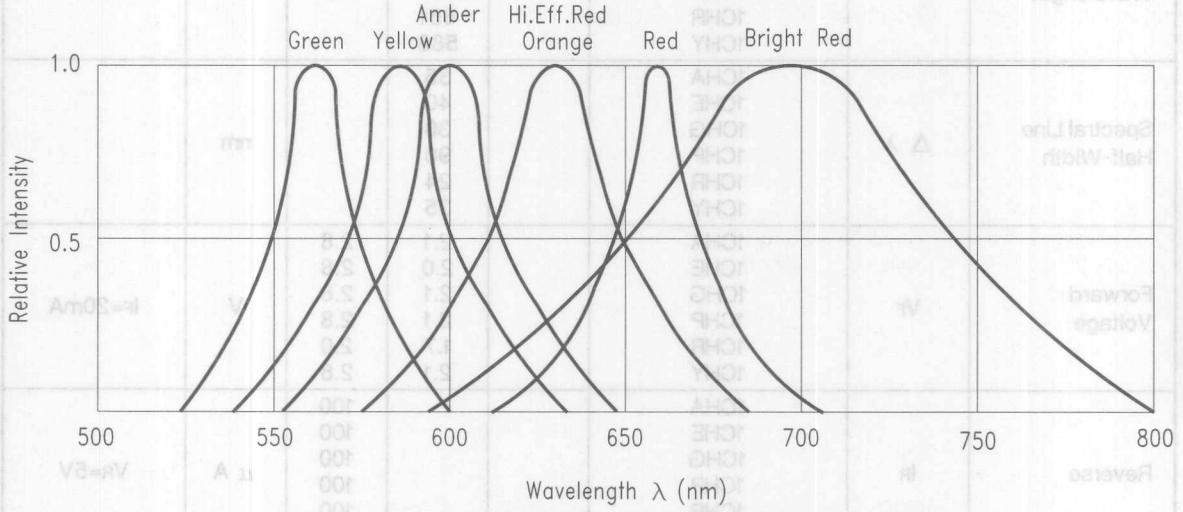


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	1CHA	3.7	12.6		mcd	IF=10mA Note 1
		1CHE	5.6	19			
		1CHG	3.7	12.6			
		1CHP	1.3	4.4			
		1CHR	0.4	1.1			
		1CHY	2.5	8.7			
Viewing Angle	2 θ 1/2	1CHA		60		deg	Note 2 (Fig.6)
		1CHE		60			
		1CHG		60			
		1CHP		60			
		1CHR		60			
		1CHY		60			
Peak Emission Wavelength	λ P	1CHA		610		nm	Measurement @ peak (Fig.1)
		1CHE		630			
		1CHG		565			
		1CHP		697			
		1CHR		655			
		1CHY		585			
Dominant Wavelength	λ d	1CHA		602		nm	Note 3
		1CHE		621			
		1CHG		569			
		1CHP		657			
		1CHR		651			
		1CHY		588			
Spectral Line Half-Width	Δ λ	1CHA		35		nm	
		1CHE		40			
		1CHG		30			
		1CHP		90			
		1CHR		24			
		1CHY		35			
Forward Voltage	VF	1CHA		2.1	2.8	V	IF=20mA
		1CHE		2.0	2.8		
		1CHG		2.1	2.8		
		1CHP		2.1	2.8		
		1CHR		1.7	2.0		
		1CHY		2.1	2.8		
Reverse	IR	1CHA			100	μ A	VR=5V
		1CHE			100		
		1CHG			100		
		1CHP			100		
		1CHR			100		
		1CHY			100		
Capacitance	C	1CHA		15		PF	VF=0 f=1MHZ
		1CHE		20			
		1CHG		35			
		1CHP		55			
		1CHR		30			
		1CHY		15			

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.

2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	1CHAE	8.7	29		mcd	IF=10mA Note 1
		1CHEE	5.6	19			
		1CHGE	12.6	40			
		1CHPE	2.5	8.7			
		1CHRE	1.1	3.7			
		1CHYE	12.6	40			
Viewing Angle	2 θ ½	1CHAE		45		deg	Note 2 (Fig.6)
		1CHEE		45			
		1CHGE		45			
		1CHPE		45			
		1CHRE		45			
		1CHYE		45			
Peak Emission Wavelength	λ P	1CHAE		610		nm	Measurement @ peak (Fig.1)
		1CHEE		635			
		1CHGE		565			
		1CHPE		697			
		1CHRE		655			
		1CHYE		585			
Dominant Wavelength	λ d	1CHAE		602		nm	Note 3
		1CHEE		621			
		1CHGE		569			
		1CHPE		657			
		1CHRE		651			
		1CHYE		588			
Spectral Line Half-Width	Δ λ	1CHAE		35		nm	
		1CHEE		40			
		1CHGE		30			
		1CHPE		90			
		1CHRE		24			
		1CHYE		35			
Forward Voltage	VF	1CHAE		2.1	2.8	V	IF= 20mA
		1CHEE		2.0	2.8		
		1CHGE		2.1	2.8		
		1CHPE		2.1	2.8		
		1CHRE		1.7	2.0		
		1CHYE		2.1	2.8		
Reverse	IR	1CHAE			100	μA	VR=5V
		1CHEE			100		
		1CHGE			100		
		1CHPE			100		
		1CHRE			100		
		1CHYE			100		
Capacitance	C	1CHAE		15		PF	VF=0 f=1MHZ
		1CHEE		20			
		1CHGE		35			
		1CHPE		55			
		1CHRE		30			
		1CHYE		15			

Notes:1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.

2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical / Optical Characteristic Curves
(25 ℃ Ambient Temperature Unless Otherwise Noted)

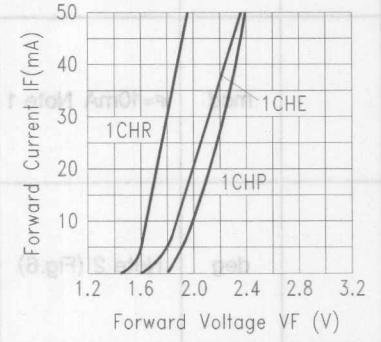


Fig.18 FORWARD CURRENT VS. FORWARD VOLTAGE

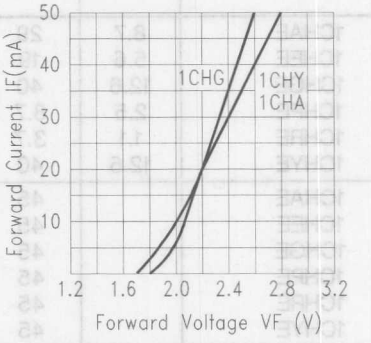


Fig.19 FORWARD CURRENT VS. FORWARD VOLTAGE

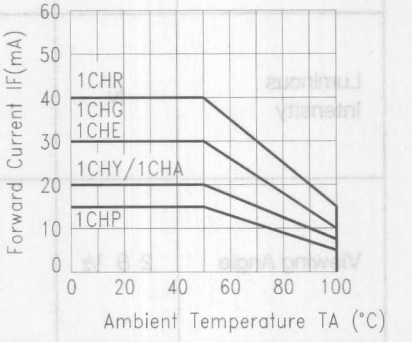


Fig.20 FORWARD CURRENT DERATING CURVE

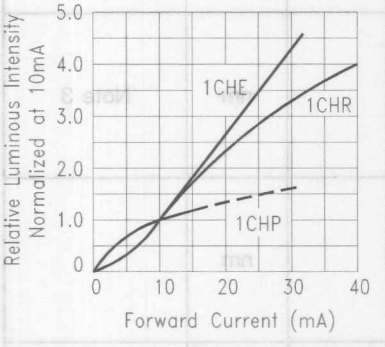


Fig.21 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

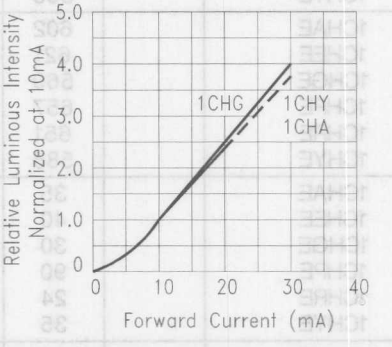


Fig.22 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

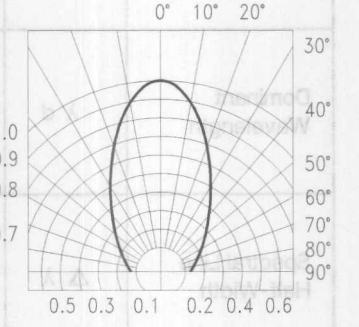


Fig.23 SPATIAL DISTRIBUTION

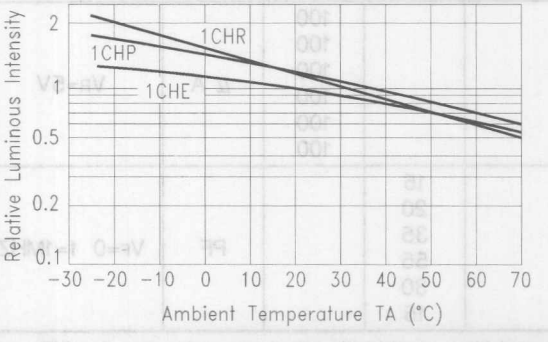


Fig.24 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

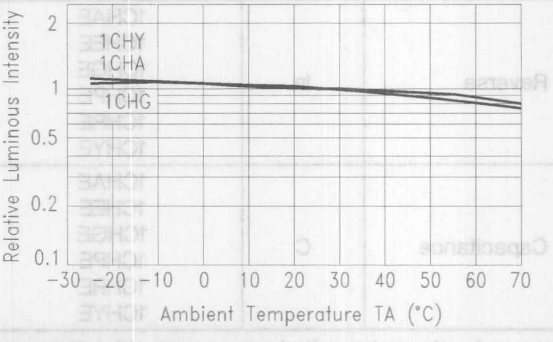


Fig.25 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

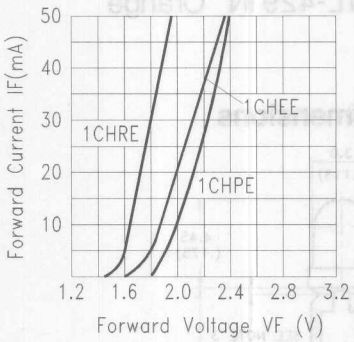


Fig.18 FORWARD CURRENT VS. FORWARD VOLTAGE

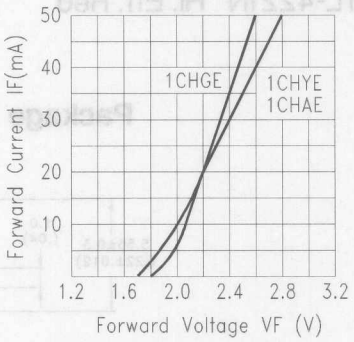


Fig.19 FORWARD CURRENT VS. FORWARD VOLTAGE

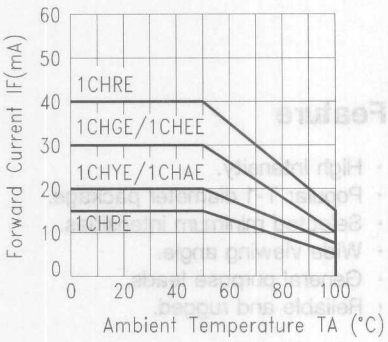


Fig.20 FORWARD CURRENT DERATING CURVE

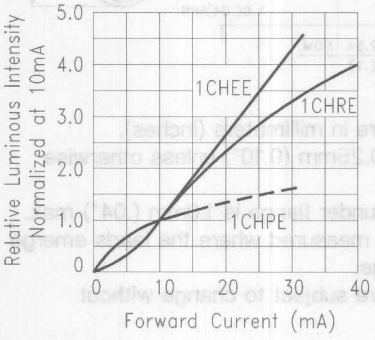


Fig.21 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

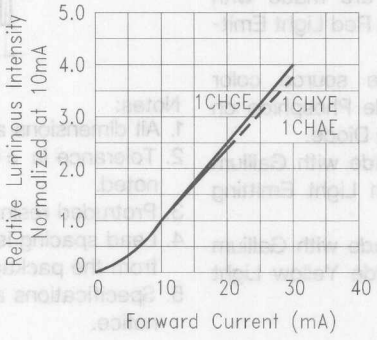


Fig.22 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

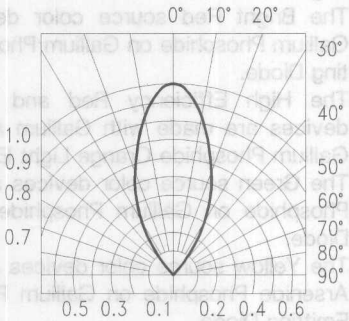


Fig.23 SPATIAL DISTRIBUTION

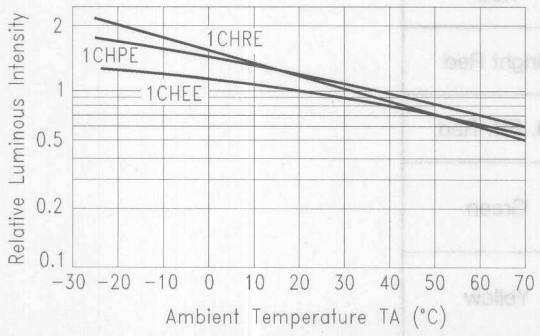


Fig.24 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

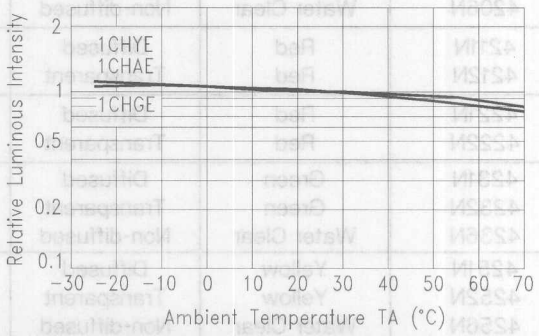


Fig.25 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

T-1 (3mm) Solid State Lamps

LTL-4201N Red
LTL-4211N Bright Red
LTL-4221N Hi. Eff. Red
LTL-4231N Green
LTL-4251N Yellow
LTL-4291N Orange

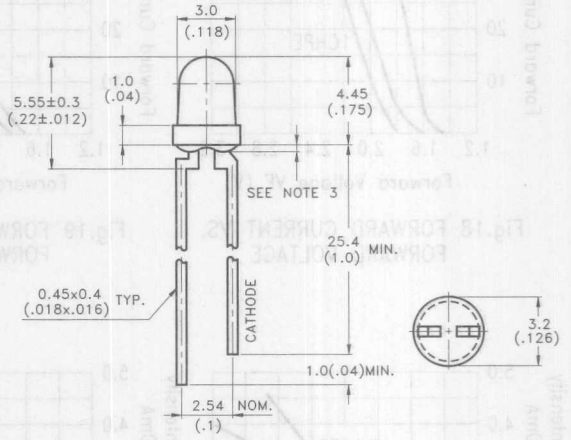
Feature

- High Intensity.
- Popular T-1 diameter package.
- Selected minimum intensities.
- Wide viewing angle.
- General purpose leads.
- Reliable and rugged.

Description

The Red source color devices are made with Gallium Arsenide Phosphide on Gallium Arsenide Red Light Emitting Diode.
The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.
The High Efficiency Red and Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (0.10") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
4201N 4206N	Red Water Clear	Diffused Non-diffused	Red
4211N 4212N	Red Red	Diffused Transparent	Bright Red
4221N 4222N	Red Red	Diffused Transparent	Hi. Eff. Red
4231N 4232N 4236N	Green Green Water Clear	Diffused Transparent Non-diffused	Green
4251N 4252N 4256N	Yellow Yellow Water Clear	Diffused Transparent Non-diffused	Yellow
4291N 4292N 4296N	Orange Orange Water Clear	Diffused Transparent Non-diffused	Orange

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Hi. Eff. Red Orange	Unit
Power Dissipation	80	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	60	120	80	120	mA
Continuous Forward Current	40	15	30	20	30	mA
Derating Linear From 50 ℃	0.5	0.2	0.4	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃					
Storage Temperature Range	-55 ℃ to +100 ℃					
Lead Soldering Temperature [1.6mm (.063") From Body]	260 ℃ for 5 Seconds					

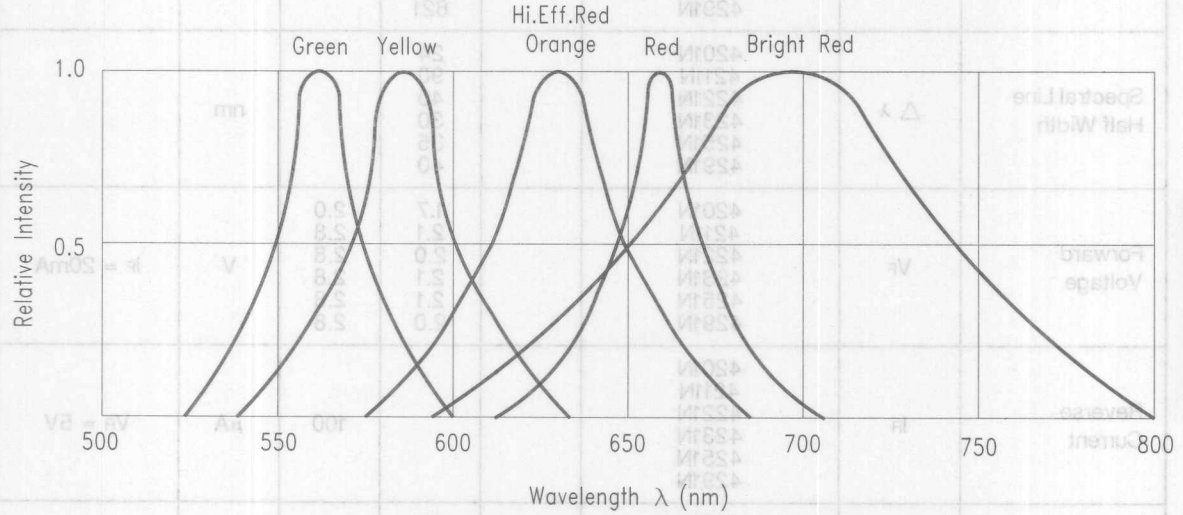


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical /Opitcal Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	4201N 4211N 4221N 4231N 4251N 4291N	0.4 1.3 2.5 3.7 1.7 2.5	1.1 4.4 8.7 12.6 5.6 8.7		mcd	IF = 10mA Note 1
Viewing Angle	2 θ 1/2	4201N 4211N 4221N 4231N 4251N 4291N		60		deg	Note 2 (Fig.7)
Peak Emission Wavelength	λP	4201N 4211N 4221N 4231N 4251N 4291N		655 697 635 565 585 630		nm	Measurement @ Peak (Fig.1)
Dominant Wavelenght	λd	4201N 4211N 4221N 4231N 4251N 4291N		651 657 621 569 588 621		nm	Note 3
Spectral Line Half Width	△ λ	4201N 4211N 4221N 4231N 4251N 4291N		24 90 40 30 35 40		nm	
Forward Voltage	VF	4201N 4211N 4221N 4231N 4251N 4291N		1.7 2.1 2.0 2.1 2.1 2.0	2.0 2.8 2.8 2.8 2.8 2.8	V	IF = 20mA
Reverse Current	IR	4201N 4211N 4221N 4231N 4251N 4291N			100	μA	VR = 5V
Capacitance	C	4201N 4211N 4221N 4231N 4251N 4291N		30 55 20 35 15 20		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Electrical /Opitcal Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N	1.1 1.7 8.7 12.6 19 5.6 12.6 5.6 19	3.7 5.6 29 40 60 19 40 19 60		mcd	IF = 10mA Note 1
Viewing Angle	2 θ 1/2	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N		45		deg	Note 2 (Fig.15)
Peak Emission Wavelength	λP	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N		655 697 635 565 565 585 585 630 630		nm	Measurement @ Peak (Fig.1)
Dominant Wavelenght	λd	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N		651 657 621 569 569 588 588 621 621		nm	Note 3
Spectral Line Half Width	△ λ	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N		24 90 40 30 30 35 35 40 40		nm	
Forward Voltage	VF	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N		1.7 2.1 2.0 2.1 2.1 2.1 2.1 2.0 2.0	2.0 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8	V	IF = 20mA
Reverse Current	IR	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N			100	μA	VR = 5V
Capacitance	C	4206N 4212N 4222N 4232N 4236N 4252N 4256N 4292N 4296N		30 55 20 35 35 15 15 20 20		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

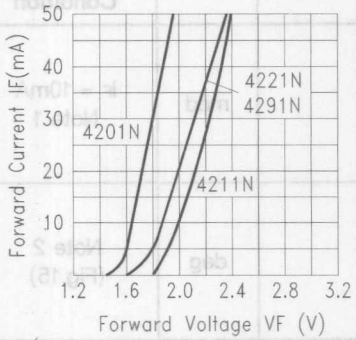


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

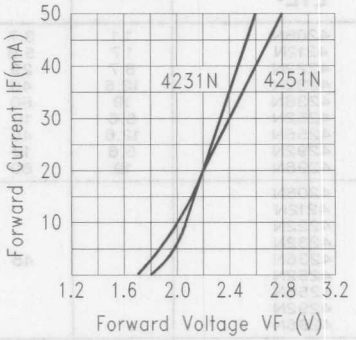


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

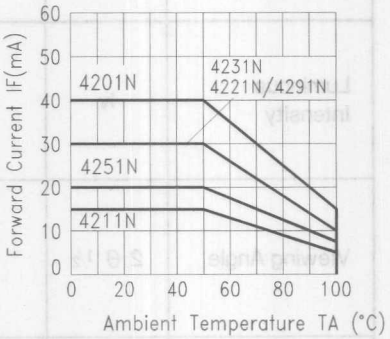


Fig.4 FORWARD CURRENT DERATING CURVE

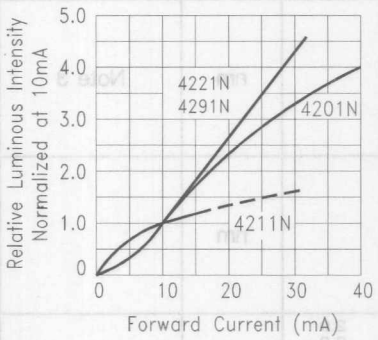


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

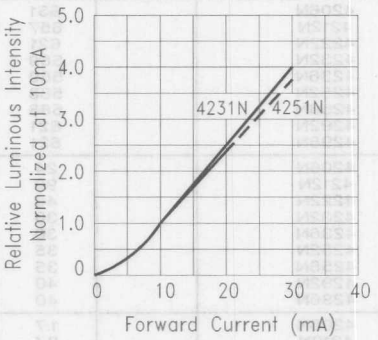


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

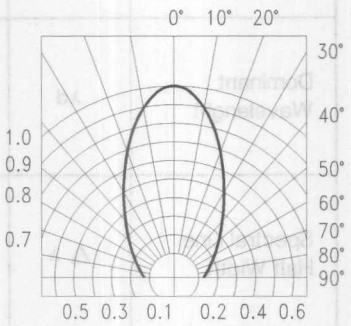


Fig.7 SPATIAL DISTRIBUTION

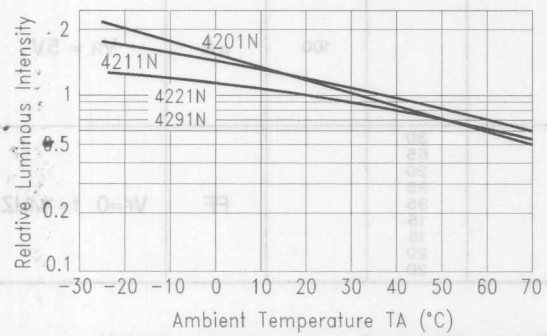


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

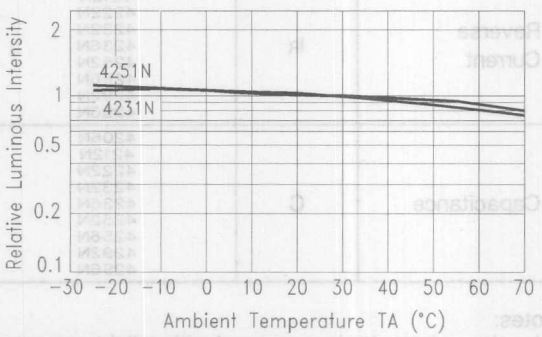


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

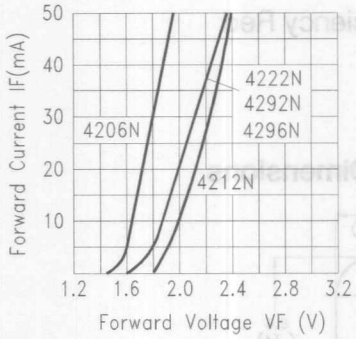


Fig.10 FORWARD CURRENT VS. FORWARD VOLTAGE

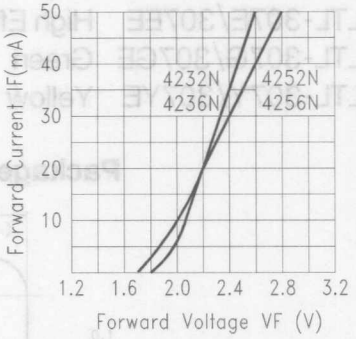


Fig.11 FORWARD CURRENT VS. FORWARD VOLTAGE

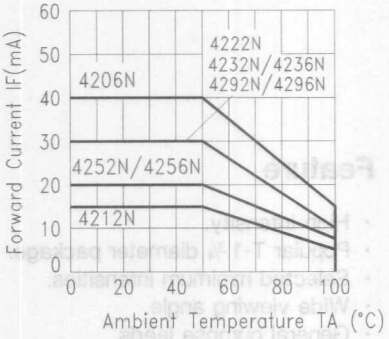


Fig.12 FORWARD CURRENT DERATING CURVE

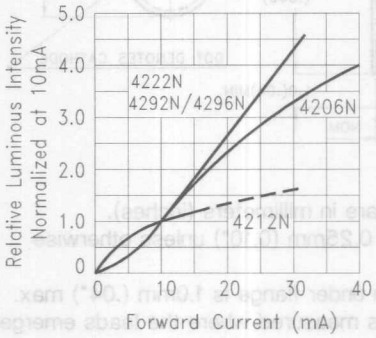


Fig.13 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

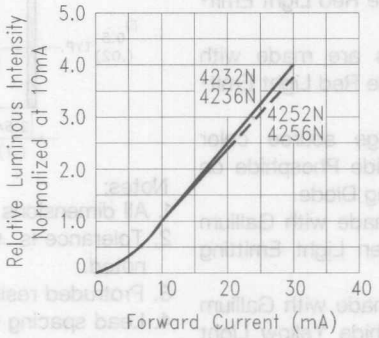


Fig.14 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

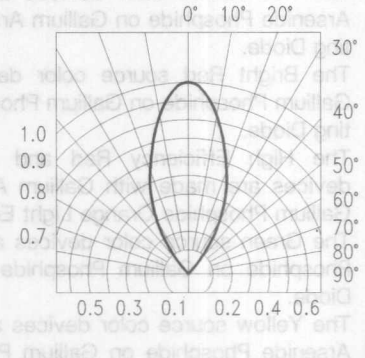


Fig.15 SPATIAL DISTRIBUTION

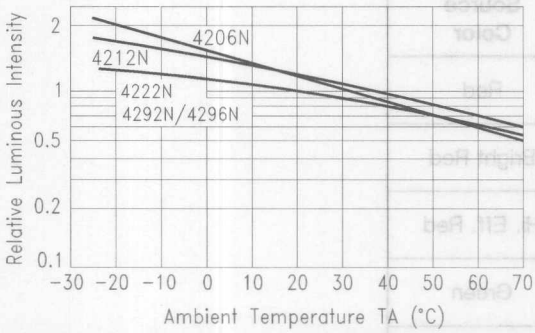


Fig.16 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

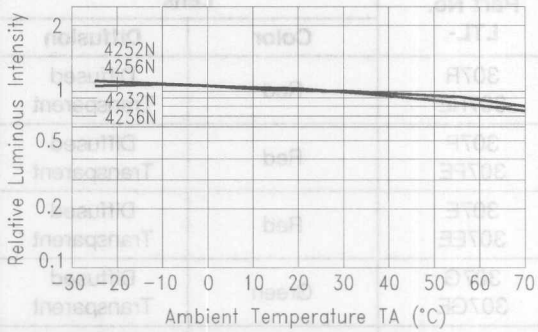


Fig.17 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

T-1¾(5mm) Solid State Lamps

LTL-307R/307RE Red
LTL-307P/307PE Bright Red
LTL-307E/307EE High Efficiency Red
LTL-307G/307GE Green
LTL-307Y/307YE Yellow

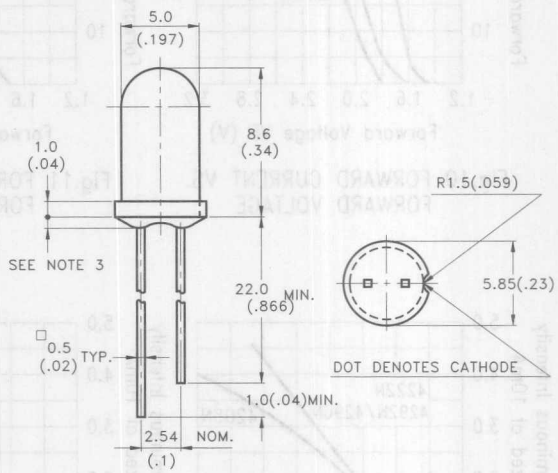
Feature

- High Intensity.
- Popular T-1 ¾ diameter package.
- Selected minimum intensities.
- Wide viewing angle.
- General purpose leads.
- Reliable and rugged.

Description

The Red source color devices are made with Gallium Arsenide Phosphide on Gallium Arsenide Red Light Emitting Diode.
The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.
The High Efficiency Red and Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (0.10") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
307R 307RE	Red	Diffused Transparent	Red
307P 307PE	Red	Diffused Transparent	Bright Red
307E 307EE	Red	Diffused Transparent	Hi. Eff. Red
307G 307GE	Green	Diffused Transparent	Green
307Y 307YE	Yellow	Diffused Transparent	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Hi. Eff. Red Orange	Unit
Power Dissipation	80	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	60	120	80	120	mA
Continuous Forward Current	40	15	30	20	30	mA
Derating Linear From 50 ℃	0.5	0.2	0.4	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃					
Storage Temperature Range	-55 ℃ to +100 ℃					
Lead Soldering Temperature [1.6mm (.063") From Body]	260 ℃ for 5 Seconds					

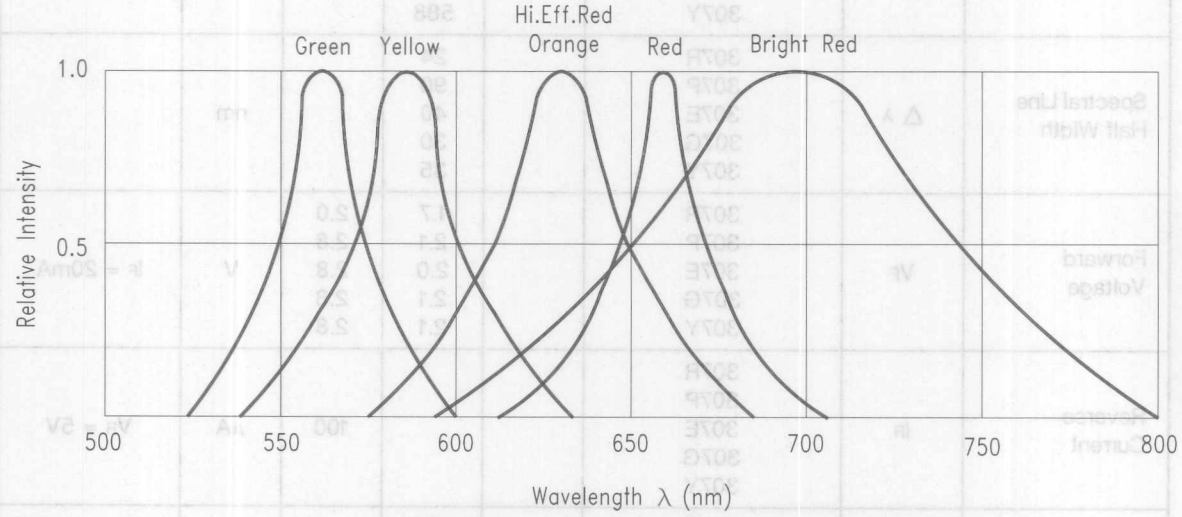


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical /Opitcal Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	307R	0.5	1.7		mcd	IF = 10mA Note 1
		307P	1.7	5.6			
		307E	5.6	19			
		307G	5.6	19			
		307Y	8.7	29			
Viewing Angle	2 θ 1/2	307R 307P 307E 307G 307Y		50		deg	Note 2 (Fig.7)
Peak Emission Wavelength	λP	307R		655		nm	Measurement @ Peak (Fig.1)
		307P		697			
		307E		635			
		307G		565			
		307Y		585			
Dominant Wavelenght	λd	307R		651		nm	Note 3
		307P		657			
		307E		621.			
		307G		569			
		307Y		588			
Spectral Line Half Width	△ λ	307R		24		nm	
		307P		90			
		307E		40			
		307G		30			
		307Y		35			
Forward Voltage	VF	307R		1.7	2.0	V	IF = 20mA
		307P		2.1	2.8		
		307E		2.0	2.8		
		307G		2.1	2.8		
		307Y		2.1	2.8		
Reverse Current	IR	307R 307P 307E 307G 307Y			100	μA	VR = 5V
Capacitance	C	307R		30		PF	VF=0 f=1MHZ
		307P		55			
		307E		20			
		307G		35			
		307Y		15			

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Electrical /Opitcal Characteristics and Curves at Ta=25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	307RE 307PE 307EE 307GE 307YE	1.1 2.5 29 19 12.6	3.7 8.7 90 60 40		mcd	IF = 10mA Note 1
Viewing Angle	2 θ 1/2	307RE 307PE 307EE 307GE 307YE		40		deg	Note 2 (Fig.15)
Peak Emission Wavelength	λP	307RE 307PE 307EE 307GE 307YE		655 697 635 565 585		nm	Measurement @ Peak (Fig.1)
Dominant Wavelenght	λd	307RE 307PE 307EE 307GE 307YE		651 657 621. 569 588		nm	Note 3
Spectral Line Half Width	△ λ	307RE 307PE 307EE 307GE 307YE		24 90 40 30 35		nm	
Forward Voltage	VF	307RE 307PE 307EE 307GE 307YE		1.7 2.1 2.0 2.1 2.1	2.0 2.8 2.8 2.8 2.8	V	IF = 20mA
Reverse Current	IR	307RE 307PE 307EE 307GE 307YE			100	μA	VR = 5V
Capacitance	C	307RE 307PE 307EE 307GE 307YE		30 55 20 35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

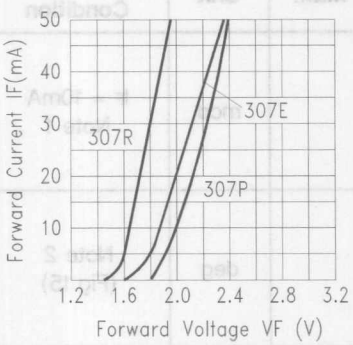


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

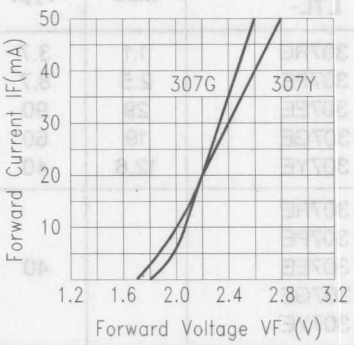


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

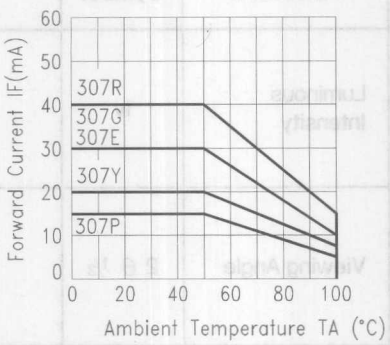


Fig.4 FORWARD CURRENT DERATING CURVE

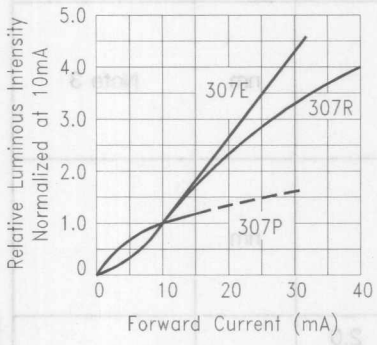


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

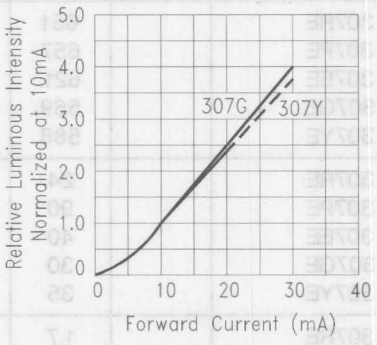


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

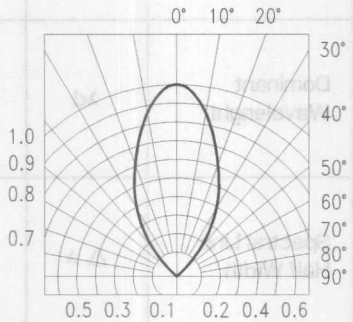


Fig.7 SPATIAL DISTRIBUTION

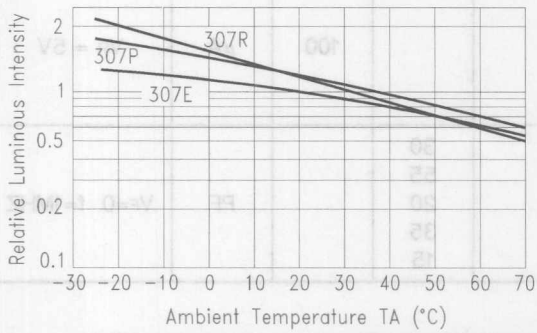


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

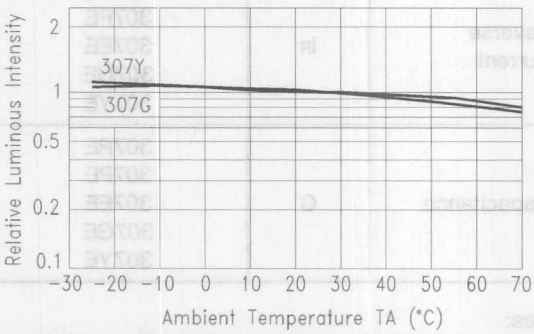


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

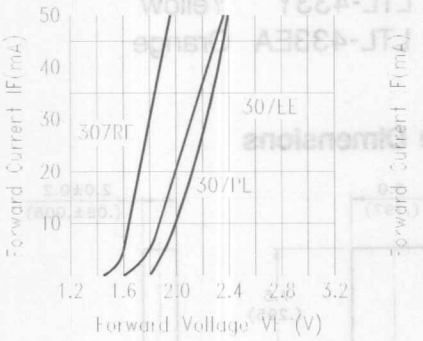


Fig.10 FORWARD CURRENT VS. FORWARD VOLTAGE

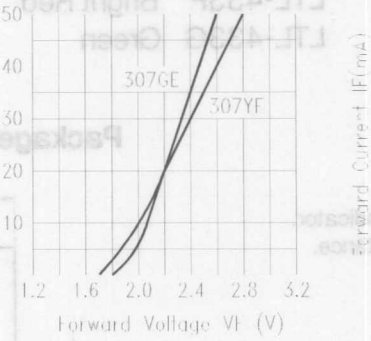


Fig.11 FORWARD CURRENT VS. FORWARD VOLTAGE

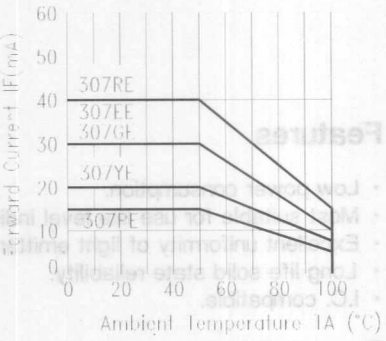


Fig.12 FORWARD CURRENT DERATING CURVE

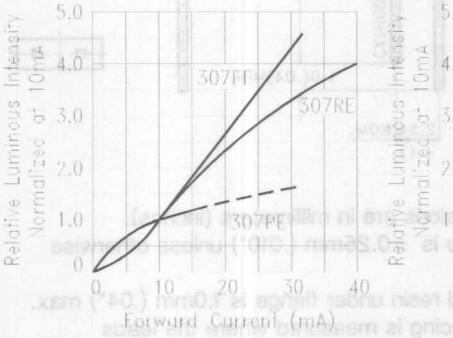


Fig.13 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

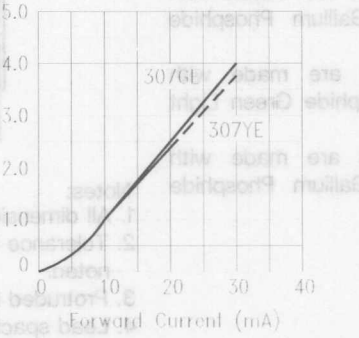


Fig.14 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

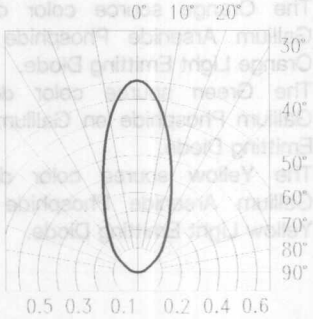


Fig.15 SPATIAL DISTRIBUTION

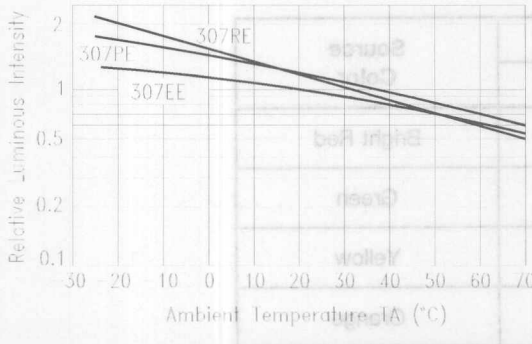


Fig.16 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

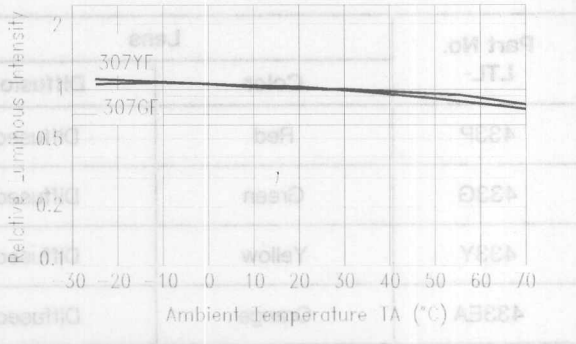


Fig.17 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LED LAMPS

LITEON

2 × 5 (mm)Rectangular Bar Flangeless LED Lamps

LTL-433P Bright Red LTL-433Y Yellow
LTL-433G Green LTL-433EA Orange

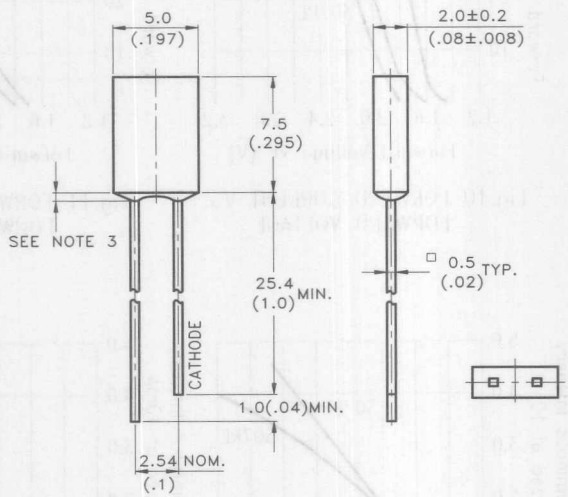
Features

- Low power consumption.
- Most suitable for use like level indicator.
- Excellent uniformity of light emittance.
- Long life solid state reliability.
- I.C. compatible.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
433P	Red	Diffused	Bright Red
433G	Green	Diffused	Green
433Y	Yellow	Diffused	Yellow
433EA	Orange	Diffused	Orange

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Yellow	Orange	Unit
Power Dissipation	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	80	120	mA
Continuous Forward Current	15	30	20	30	mA
Derating Linear From 50 ℃	0.2	0.4	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃				
Storage Temperature Range	-55 ℃ to +100 ℃				
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds				

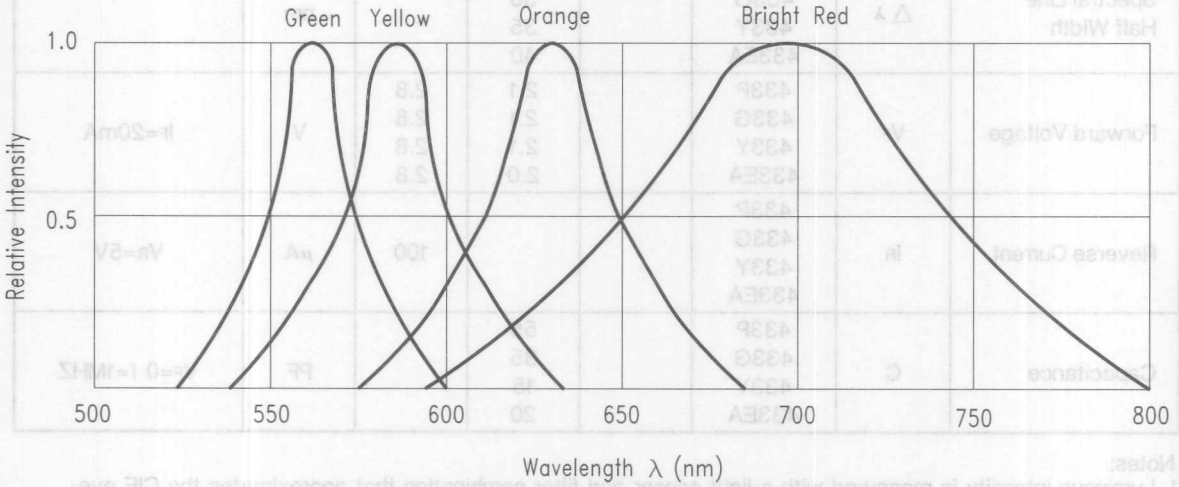


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	433P	0.4	1.1		mcd	IF=10 mA Note 1
		433G	1.1	3.7			
		433Y	1.1	3.7			
		433EA	1.1	3.7			
Viewing Angle	2 θ ½	433P 433G 433Y 433EA		140		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	433P		697		nm	Measurement @Peak (Fig.1)
		433G		565			
		433Y		585			
		433EA		630			
Dominant Wavelength	λd	433P		657		nm	Note 3
		433G		569			
		433Y		588			
		433EA		621			
Spectral Line Half Width	△λ	433P		90		nm	
		433G		30			
		433Y		35			
		433EA		40			
Forward Voltage	VF	433P		2.1	2.8	V	IF=20mA
		433G		2.1	2.8		
		433Y		2.1	2.8		
		433EA		2.0	2.8		
Reverse Current	IR	433P 433G 433Y 433EA			100	μA	VR=5V
Capacitance	C	433P		55		PF	VF=0 f=1MHZ
		433G		35			
		433Y		15			
		433EA		20			

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

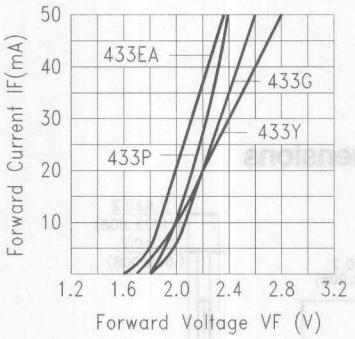


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

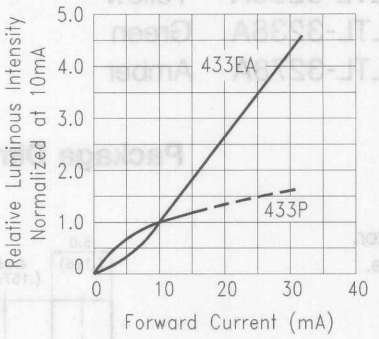


Fig.3 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

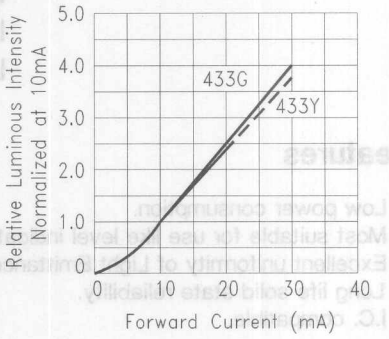


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

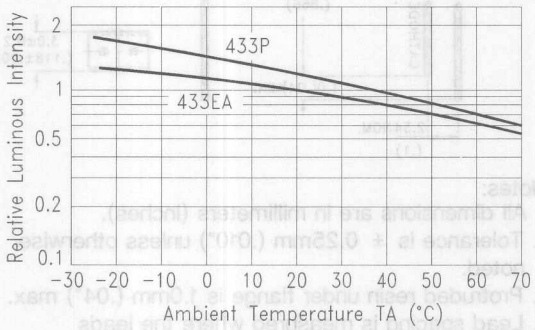


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

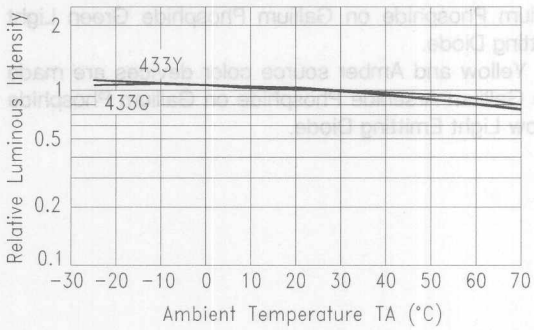


Fig.6 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

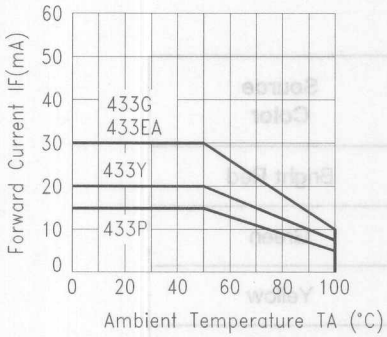


Fig.7 FORWARD CURRENT DERATING CURVE

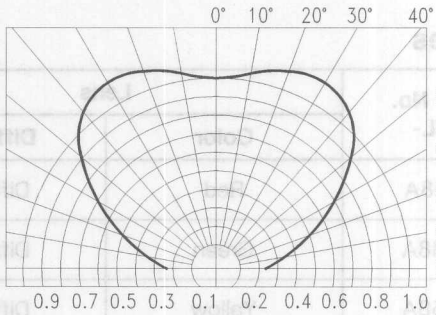


Fig.8 SPATIAL DISTRIBUTION

Rectangular Bars LED Lamps

LTL-3218A Bright Red
LTL-3258A Yellow
LTL-3238A Green
LTL-3278A Amber

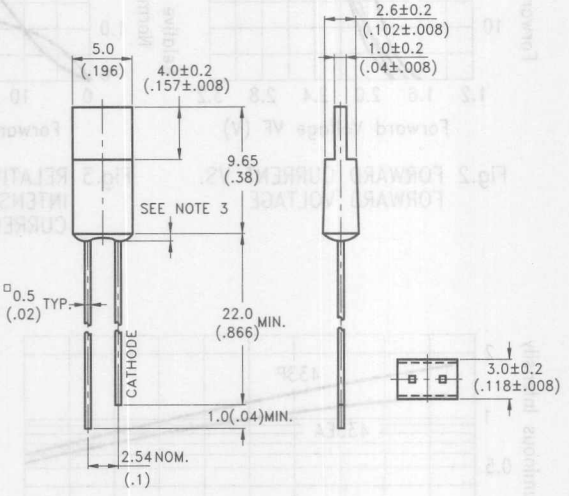
Features

- Low power consumption.
- Most suitable for use like level indicator.
- Excellent uniformity of Light Emittance.
- Long life solid state reliability.
- I.C. compatible.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow and Amber source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
3218A	Red	Diffused	Bright Red
3238A	Green	Diffused	Green
3258A	Yellow	Diffused	Yellow
3278A	Amber	Diffused	Amber

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Yellow Amber	Unit
Power Dissipation	40	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	80	mA
Continuous Forward Current	15	30	20	mA
Derating Linear From 50 ℃	0.2	0.4	0.25	mA/ ℃
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃			
Storage Temperature Range	-55 ℃ to +100 ℃			
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds			

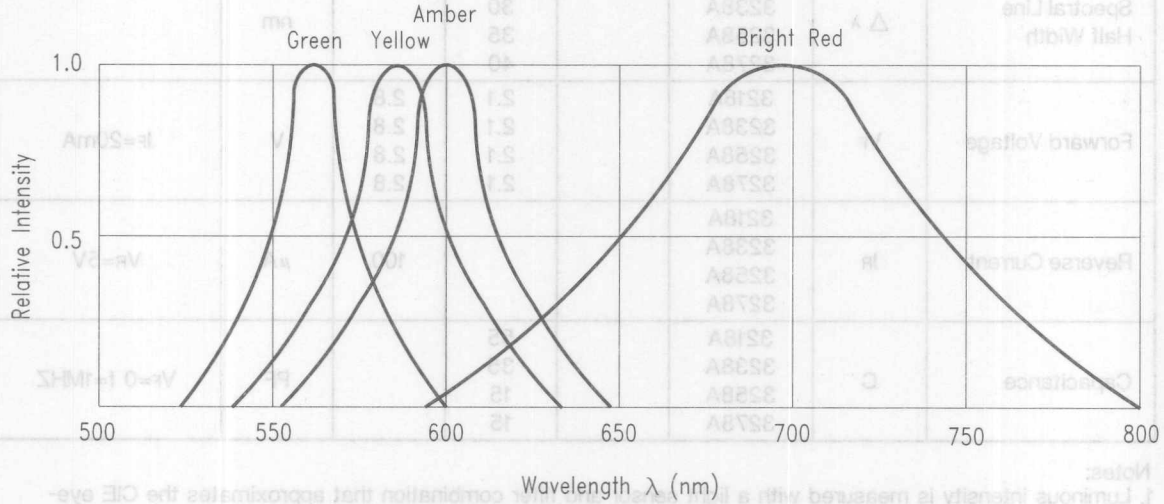


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	3218A 3238A 3258A 3278A	0.4 1.1 0.7 0.7	1.1 3.7 2.5 2.5		mcd	IF=10 mA Note 1
Viewing Angle	2 θ 1/2	3218A 3238A 3258A 3278A		106		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	3218A 3238A 3258A 3278A		697 565 585 630		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	3218A 3238A 3258A 3278A		657 569 588 621		nm	Note 3
Spectral Line Half Width	△ λ	3218A 3238A 3258A 3278A		90 30 35 40		nm	
Forward Voltage	VF	3218A 3238A 3258A 3278A		2.1 2.1 2.1 2.1	2.8 2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	3218A 3238A 3258A 3278A			100	μA	VR=5V
Capacitance	C	3218A 3238A 3258A 3278A		55 35 15 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

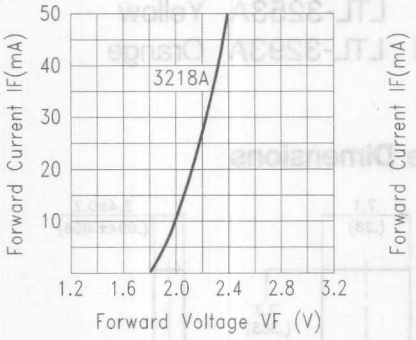


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

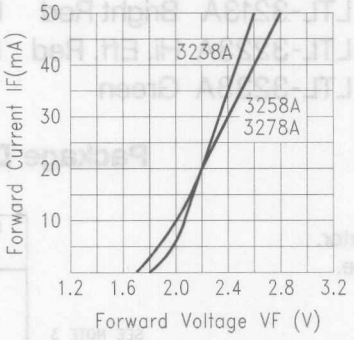


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

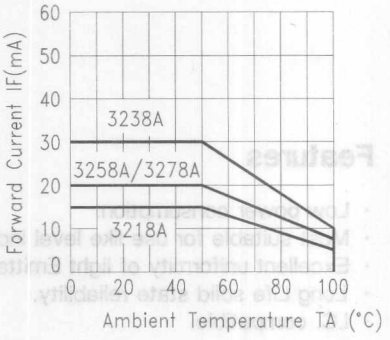


Fig.4 FORWARD CURRENT DERATING CURVE

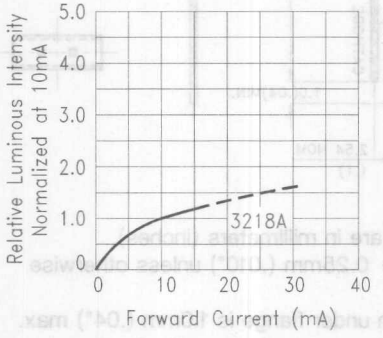


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

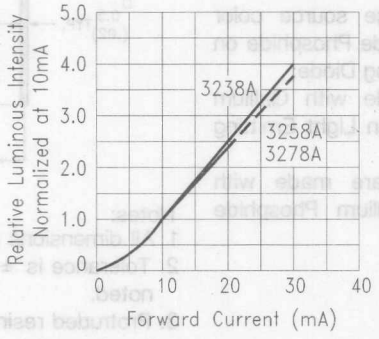


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

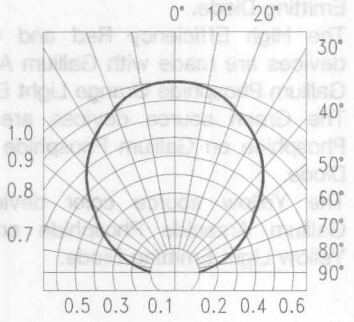


Fig.7 SPATIAL DISTRIBUTION

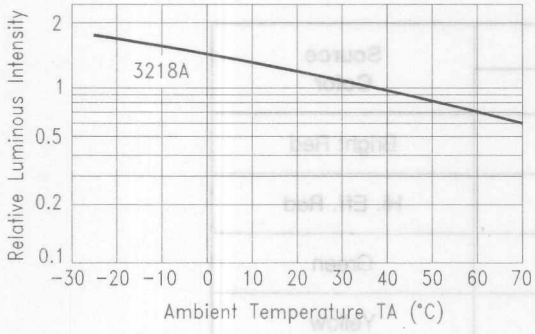


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

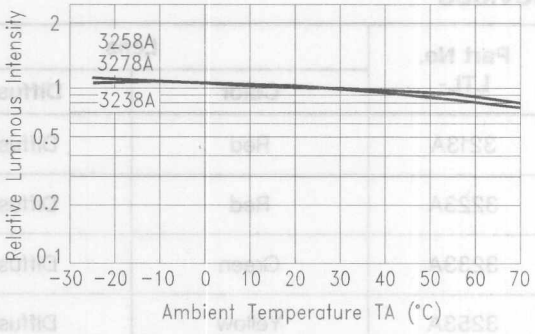


Fig.9 LUMINOUS JNTENSITY VS. AMBIENT TEMPERATURE

LED LAMPS

LITEON

2.5 × 7.1 (mm) Rectangular Bar LED Lamps

LTL-3213A Bright Red LTL-3253A Yellow
LTL-3223A Hi. Eff. Red LTL-3293A Orange
LTL-3233A Green

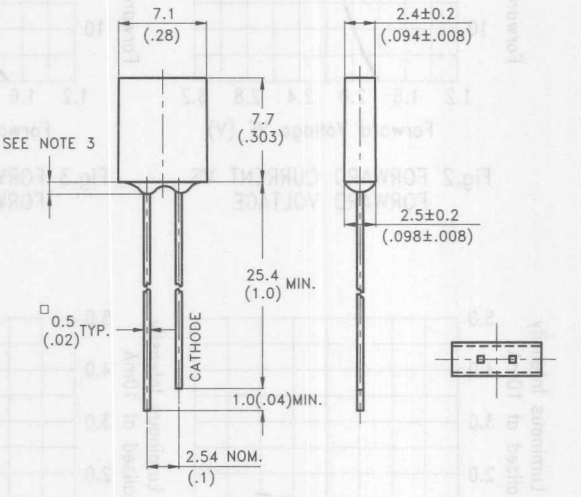
Features

- Low power consumption.
- Most suitable for use like level indicator.
- Excellent uniformity of light Emittance.
- Long Life solid state reliability.
- I.C. compatible.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.
The High Efficiency Red and Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
3213A	Red	Diffusion	Bright Red
3223A	Red	Diffusion	Hi. Eff. Red
3233A	Green	Diffusion	Green
3253A	Yellow	Diffusion	Yellow
3293A	Orange	Diffusion	Orange

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Yellow	Hi.Eff.Red Orange	Unit
Power Dissipation	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	80	120	mA
Continuous Forward Current	15	30	20	30	mA
Derating Linear From 50 ℃	0.2	0.4	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃				
Storage Temperature Range	-55 ℃ to +100 ℃				
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds				

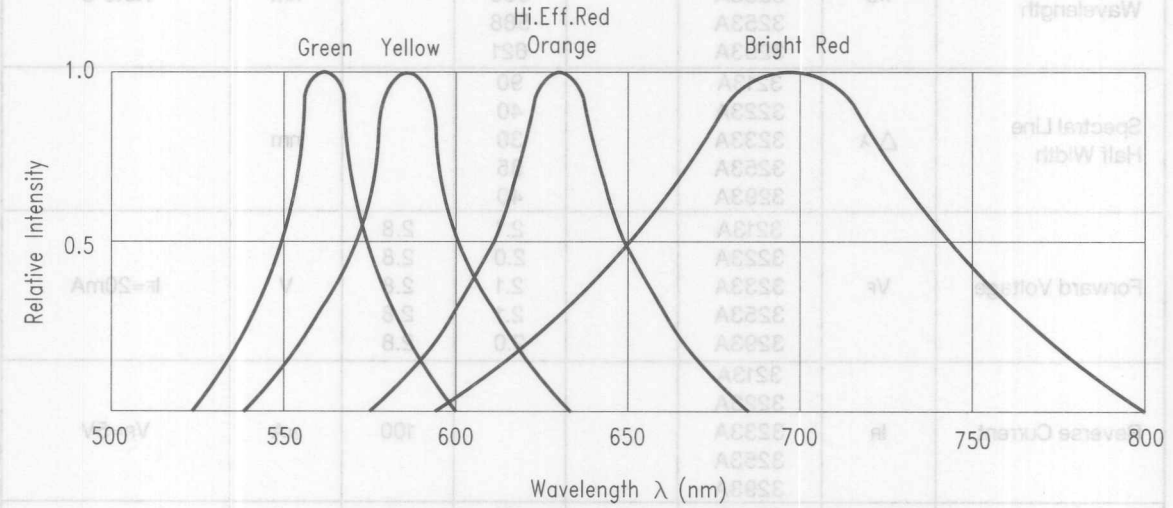


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	3213A	0.3	0.7		mcd	IF=10 mA Note 1
		3223A	1.7	5.6			
		3233A	1.1	3.7			
		3253A	0.5	1.7			
		3293A	1.7	5.6			
Viewing Angle	2 θ ½	3213A 3223A 3233A 3253A 3293A		130		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	3213A		697		nm	Measurement @Peak (Fig.1)
		3223A		635			
		3233A		565			
		3253A		585			
		3293A		630			
Dominant Wavelength	λd	3213A		657		nm	Note 3
		3223A		621			
		3233A		569			
		3253A		588			
		3293A		621			
Spectral Line Half Width	△λ	3213A		90		nm	
		3223A		40			
		3233A		30			
		3253A		35			
		3293A		40			
Forward Voltage	VF	3213A		2.1	2.8	V	IF=20mA
		3223A		2.0	2.8		
		3233A		2.1	2.8		
		3253A		2.1	2.8		
		3293A		2.0	2.8		
Reverse Current	IR	3213A 3223A 3233A 3253A 3293A			100	μA	VR=5V
Capacitance	C	3213A		55		PF	VF=0 f=1MHZ
		3223A		20			
		3233A		35			
		3253A		15			
		3293A		20			

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

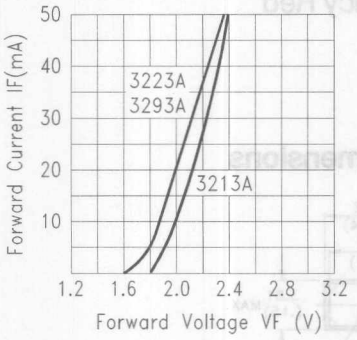


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

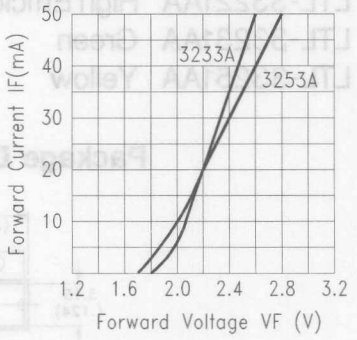


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

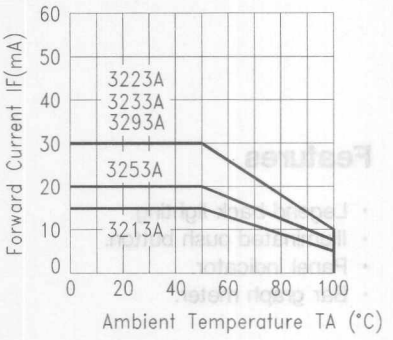


Fig.4 FORWARD CURRENT DERATING CURVE

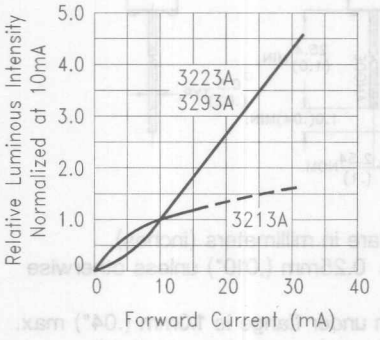


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

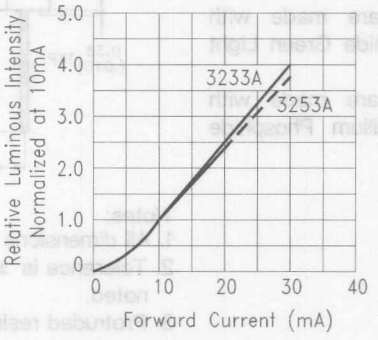


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

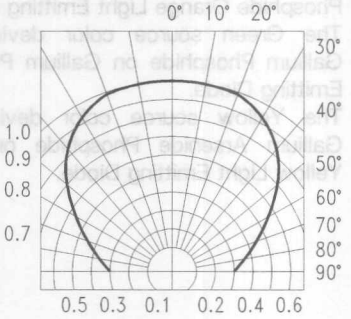


Fig.7 SPATIAL DISTRIBUTION

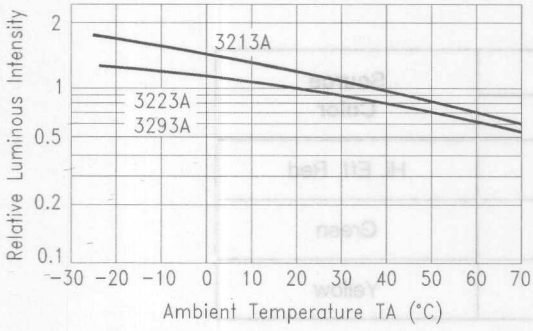


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

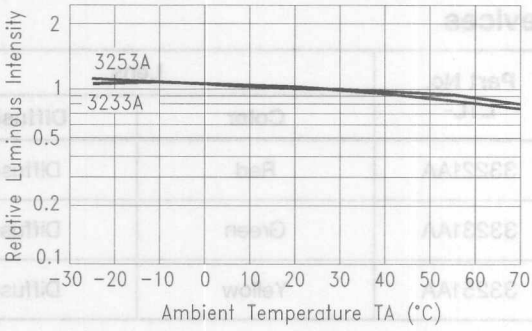


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LED LAMPS

LITEON

3.2 × 5.6 (mm) Reflector Cap Rectangular Bars

LTL-33221AA High Efficiency Red
LTL-33231AA Green
LTL-33251AA Yellow

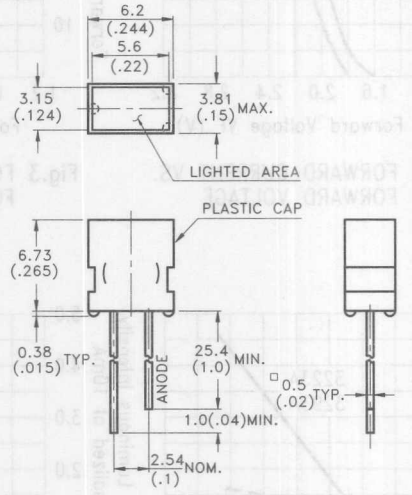
Features

- Legend back lighting.
- Illuminated push button.
- Panel indicator.
- Bar graph meter.

Description

The High Efficiency Red source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
33221AA	Red	Diffused	Hi. Eff. Red
33231AA	Green	Diffused	Green
33251AA	Yellow	Diffused	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Hi.Eff.Red	Green	Yellow	Unit
Power Dissipation	100	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	80	mA
Continuous Forward Current	30	30	20	mA
Derating Linear From 50 ℃	0.4	0.4	0.25	mA/ ℃
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃			
Storage Temperature Range	-55 ℃ to +100 ℃			
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds			

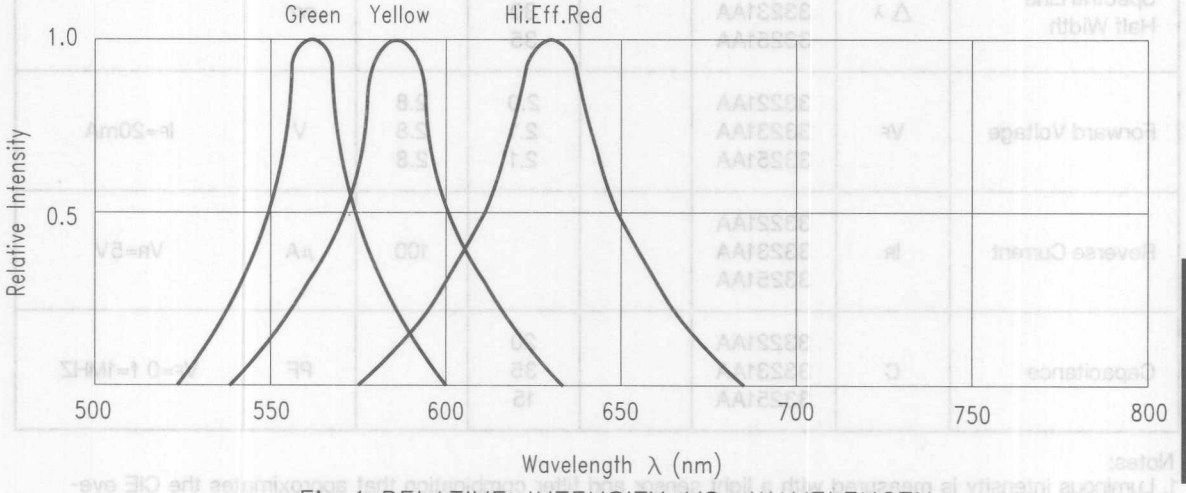


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	33221AA 33231AA 33251AA	1.7 1.7 2.5	5.6 5.6 8.7		mcd	IF=10 mA Note 1
Viewing Angle	2 θ ½	33221AA 33231AA 33251AA		100		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	33221AA 33231AA 33251AA		635 565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	33221AA 33231AA 33251AA		621 569 588		nm	Note 3
Spectral Line Half Width	△ λ	33221AA 33231AA 33251AA		40 30 35		nm	
Forward Voltage	VF	33221AA 33231AA 33251AA		2.0 2.1 2.1	2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	33221AA 33231AA 33251AA			100	μA	VR=5V
Capacitance	C	33221AA 33231AA 33251AA		20 35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta \frac{1}{2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

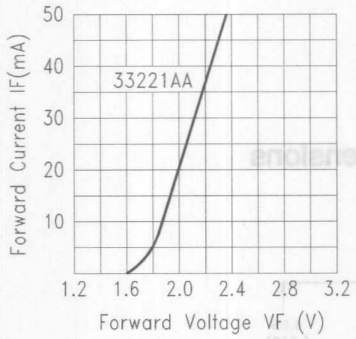


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

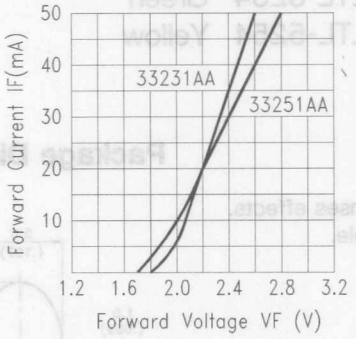


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

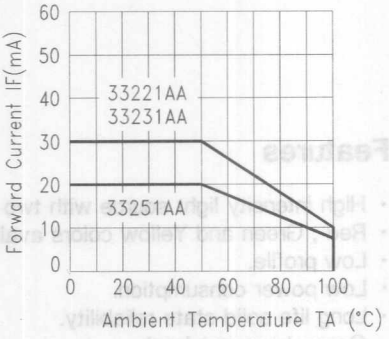


Fig.4 FORWARD CURRENT DERATING CURVE

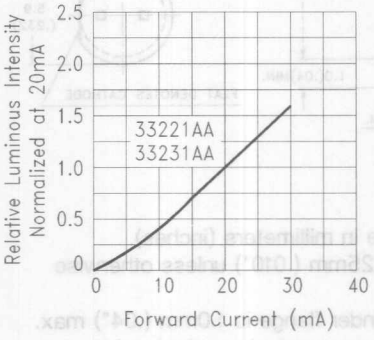


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

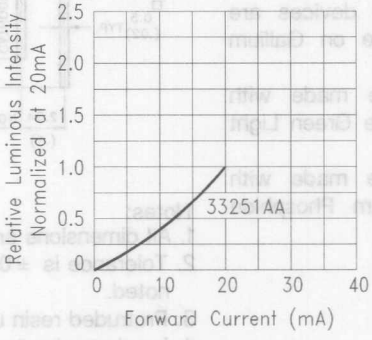


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

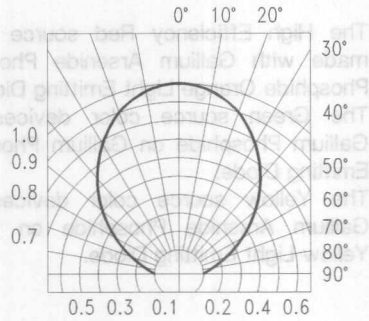


Fig.7 SPATIAL DISTRIBUTION

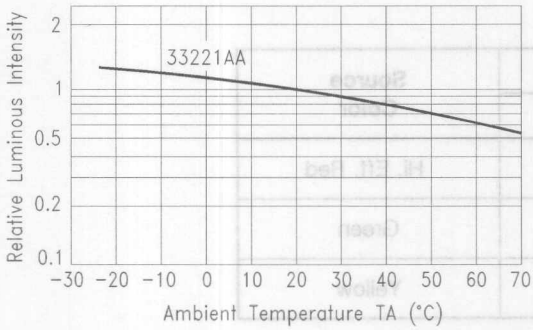


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

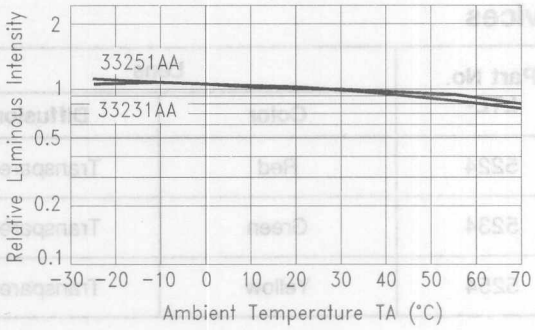


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

T-1 3/4 (5mm) Low Profile Lamps

LTL-5224 High Efficiency Red
LTL-5234 Green
LTL-5254 Yellow

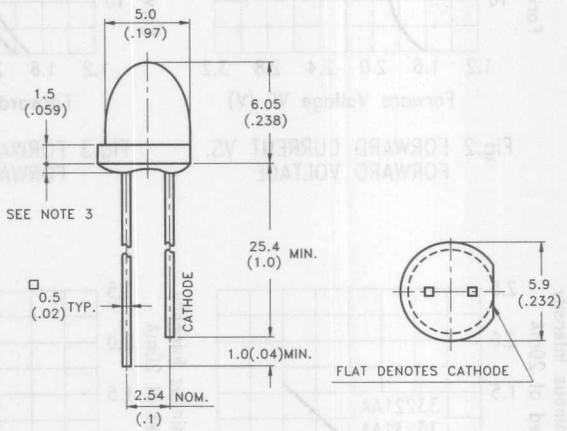
Features

- High intensity light source with two lenses effects.
- Red , Green and Yellow colors available.
- Low profile.
- Low power consumption.
- Long life solid state reliability.
- General purpose leads.
- I.C. compatible/low current requirements.
- Reliable and rugged.

Description

The High Efficiency Red source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
5224	Red	Transparent	Hi. Eff. Red
5234	Green	Transparent	Green
5254	Yellow	Transparent	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Hi. Eff. Red	Green	Yellow	Unit
Power Dissipation	100	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	80	mA
Continuous Forward Current	30	30	20	mA
Derating Linear From 50 ℃	0.4	0.4	0.25	mA/ ℃
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃			
Storage Temperature Range	-55 ℃ to +100 ℃			
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds			

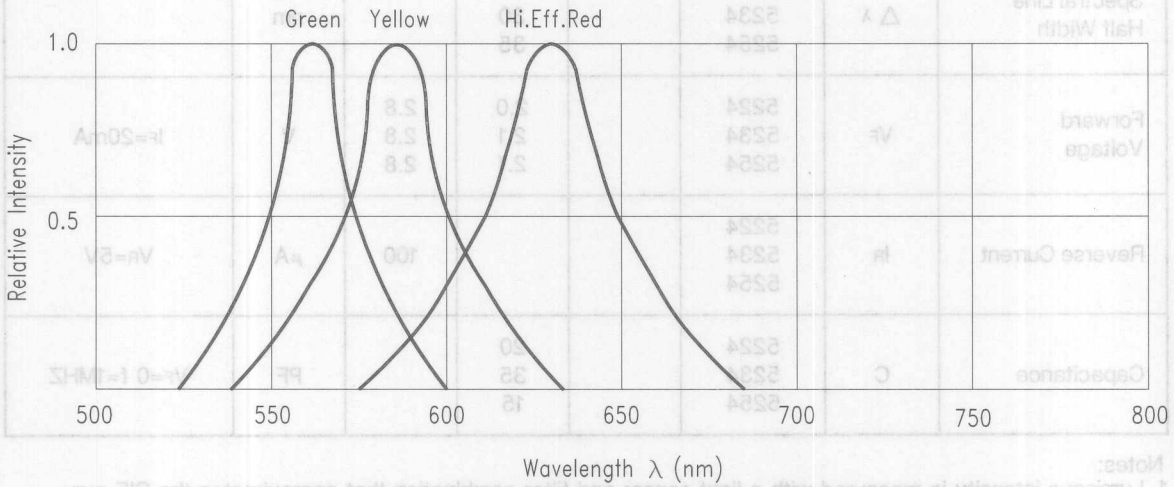


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	5224 5234 5254	1.7 1.7 1.0	5.6 5.6 4.0		mcd	IF=10 mA Note 1
Viewing Angle	2 θ 1/2	5224 5234 5254		44		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	5224 5234 5254		635 565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	5224 5234 5254		621 569 588		nm	Note 3
Spectral Line Half Width	△ λ	5224 5234 5254		40 30 35		nm	
Forward Voltage	VF	5224 5234 5254		2.0 2.1 2.1	2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	5224 5234 5254			100	μA	VR=5V
Capacitance	C	5224 5234 5254		20 35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

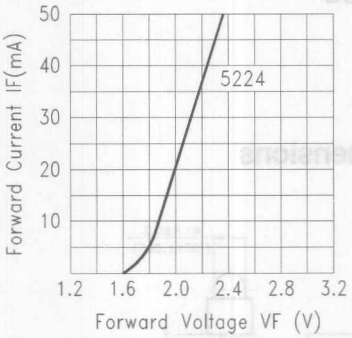


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

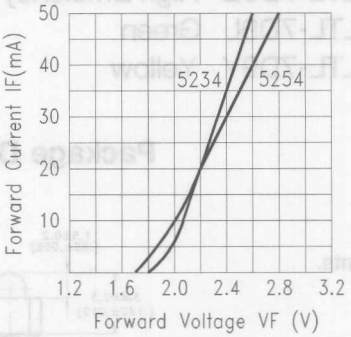


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

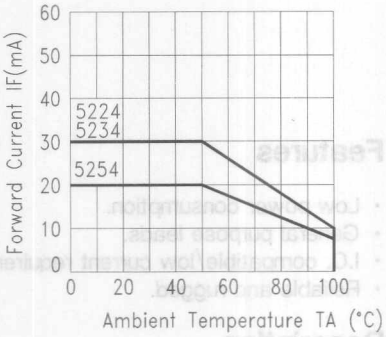


Fig.4 FORWARD CURRENT DERATING CURVE

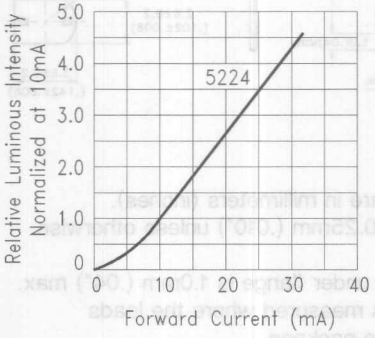


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

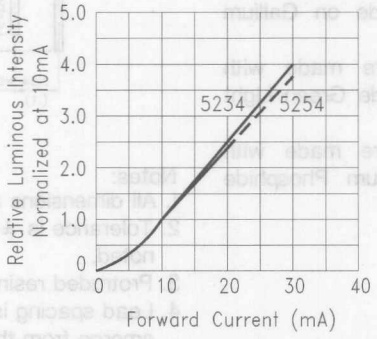


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

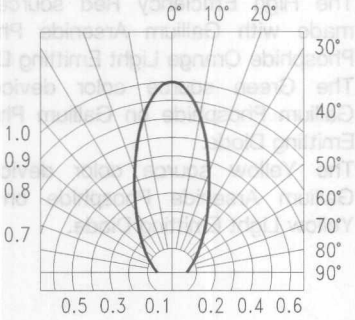


Fig.7 SPATIAL DISTRIBUTION

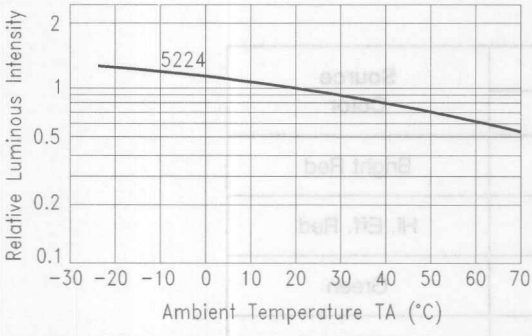


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

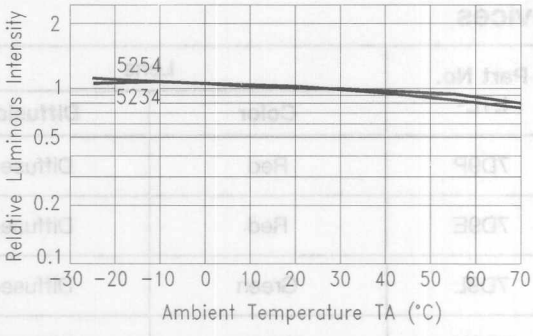


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

1.8mm Dot Point LED Lamps

LTL-7D9P Bright Red
LTL-7D9E High Efficiency Red
LTL-7D9L Green
LTL-7D9Y Yellow

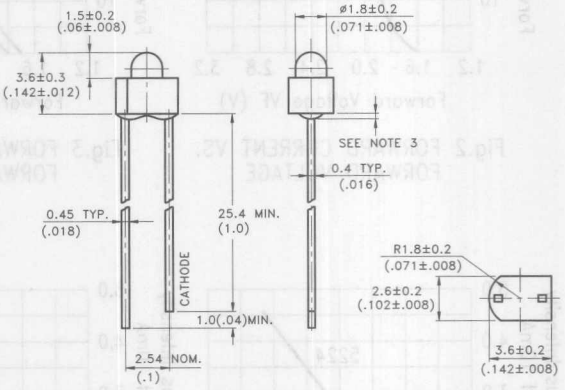
Features

- Low power consumption.
- General purpose leads.
- I.C. compatible/low current requirements.
- Reliable and rugged.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting diode.
The High Efficiency Red source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
7D9P	Red	Diffused	Bright Red
7D9E	Red	Diffused	Hi. Eff. Red
7D9L	Green	Diffused	Green
7D9Y	Yellow	Diffused	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Yellow	Hi.Eff.Red	Unit
Power Dissipation	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	80	120	mA
Continuous Forward Current	15	30	20	30	mA
Derating Linear From 50 ℃	0.2	0.4	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃				
Storage Temperature Range	-55 ℃ to +100 ℃				
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds				

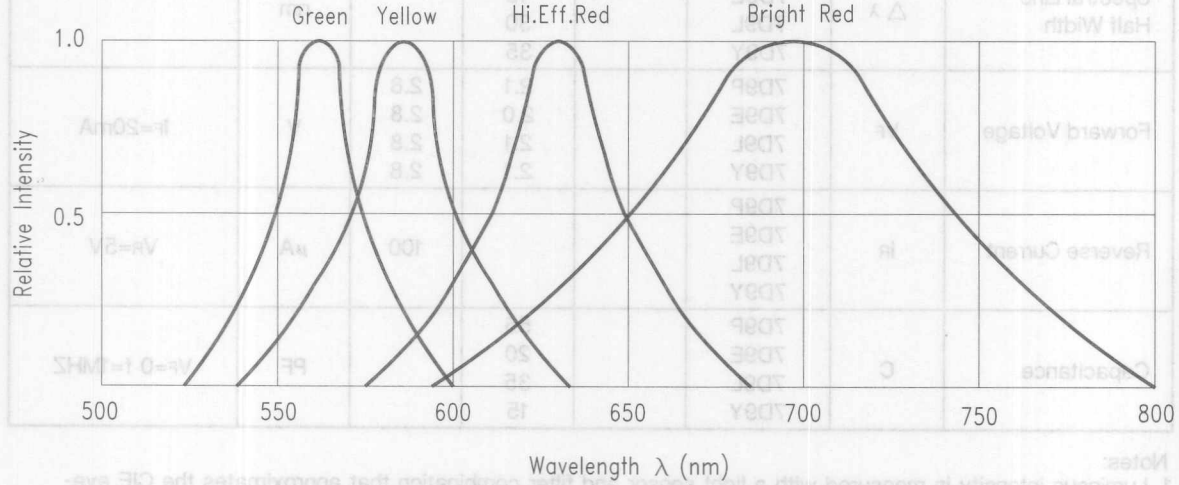


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	7D9P	11	3.7		mcd	IF=10 mA Note 1
		7D9E	3.7	12.6			
		7D9L	2.5	8.7			
		7D9Y	3.7	12.6			
Viewing Angle	2 θ 1/2	7D9P 7D9E 7D9L 7D9Y		38		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	7D9P		697		nm	Measurement @Peak (Fig.1)
		7D9E		635			
		7D9L		565			
		7D9Y		585			
Dominant Wavelength	λd	7D9P		657		nm	Note 3
		7D9E		621			
		7D9L		569			
		7D9Y		588			
Spectral Line Half Width	△ λ	7D9P		90		nm	
		7D9E		40			
		7D9L		30			
		7D9Y		35			
Forward Voltage	VF	7D9P		2.1	2.8	V	IF=20mA
		7D9E		2.0	2.8		
		7D9L		2.1	2.8		
		7D9Y		2.1	2.8		
Reverse Current	IR	7D9P 7D9E 7D9L 7D9Y			100	μA	VR=5V
Capacitance	C	7D9P		55		PF	VF=0 f=1MHZ
		7D9E		20			
		7D9L		35			
		7D9Y		15			

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

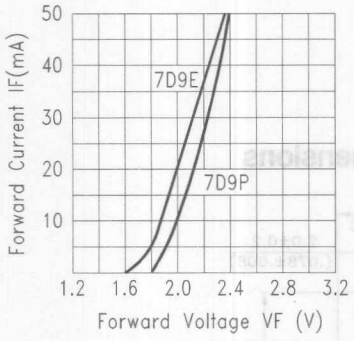


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

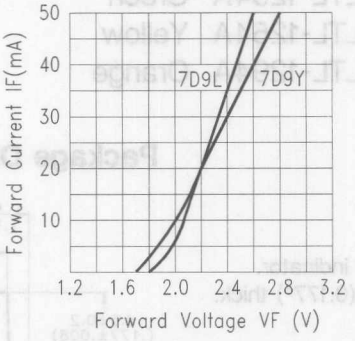


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

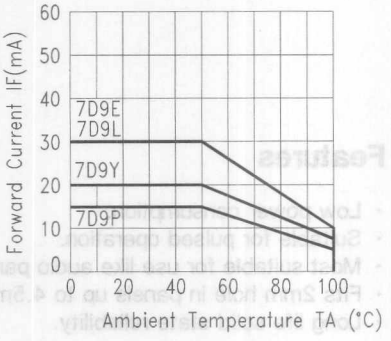


Fig.4 FORWARD CURRENT DERATING CURVE

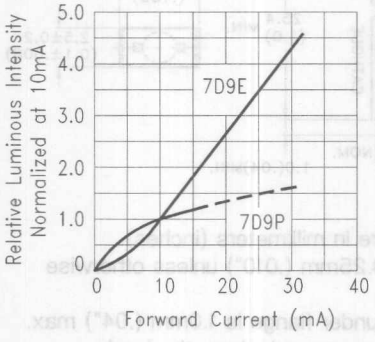


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

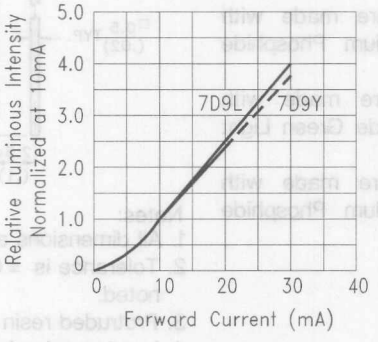


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

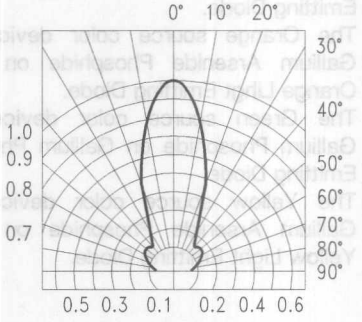


Fig.7 SPATIAL DISTRIBUTION

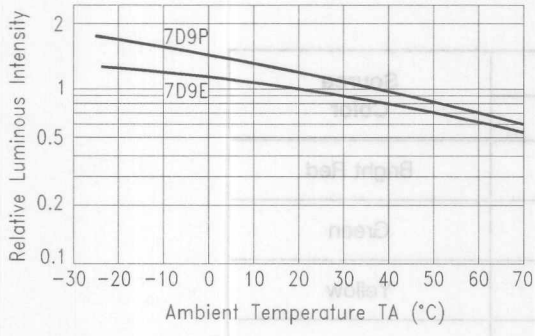


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

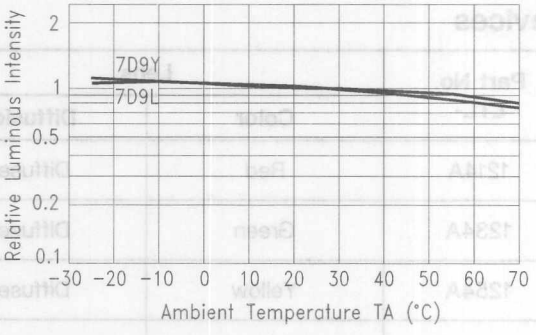


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

LED Panel Dot Indicators

LTL-1214A Bright Red
LTL-1234A Green
LTL-1254A Yellow
LTL-1294A Orange

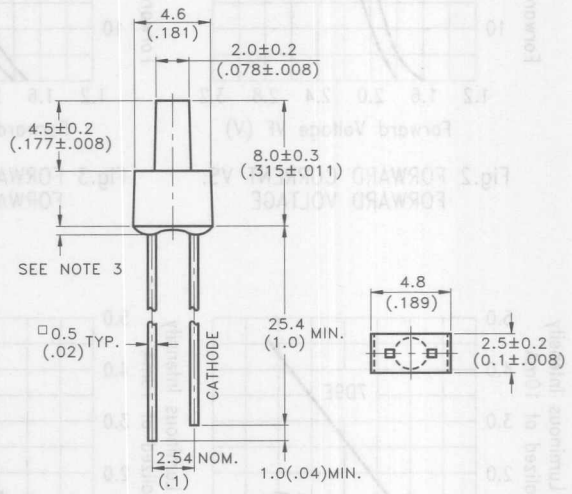
Features

- Low power consumption.
- Suitable for pulsed operation.
- Most suitable for use like audio panel indicator.
- Fits 2mm hole in panels up to 4.5mm(0.177") thick.
- Long life solid state reliability.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Lihgt Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
1214A	Red	Diffused	Bright Red
1234A	Green	Diffused	Green
1254A	Yellow	Diffused	Yellow
1294A	Orange	Diffused	Orange

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Yellow	Orange	Unit
Power Dissipation	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	80	120	mA
Continuous Forward Current	15	30	20	30	mA
Derating Linear From 50 ℃	0.2	0.4	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃				
Storage Temperature Range	-55 ℃ to +100 ℃				
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds				

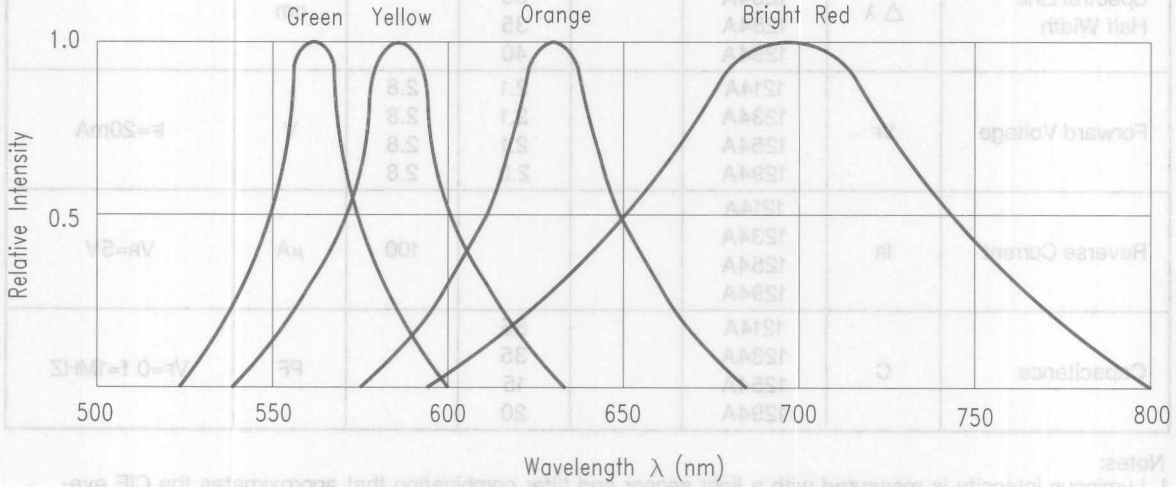


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	1214A 1234A 1254A 1294A	0.4 0.7 1.1 0.7	1.1 1.7 3.7 2.5		mcd	IF=10 mA Note 1
Viewing Angle	2 θ ½	1214A 1234A 1254A 1294A		120		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	1214A 1234A 1254A 1294A		697 565 585 630		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	1214A 1234A 1254A 1294A		657 569 588 621		nm	Note 3
Spectral Line Half Width	△λ	1214A 1234A 1254A 1294A		90 30 35 40		nm	
Forward Voltage	VF	1214A 1234A 1254A 1294A		2.1 2.1 2.1 2.0	2.8 2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	1214A 1234A 1254A 1294A			100	μA	VR=5V
Capacitance	C	1214A 1234A 1254A 1294A		55 35 15 20		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta \frac{1}{2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

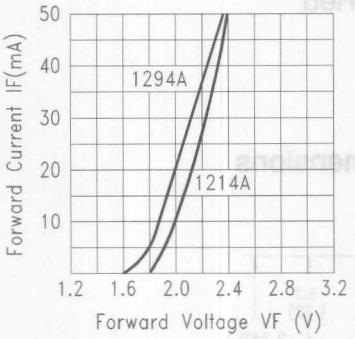


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

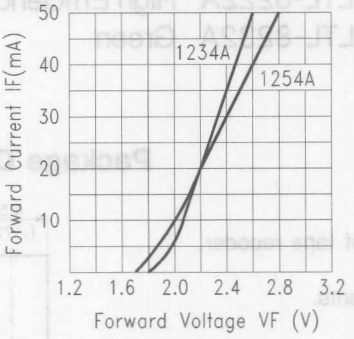


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

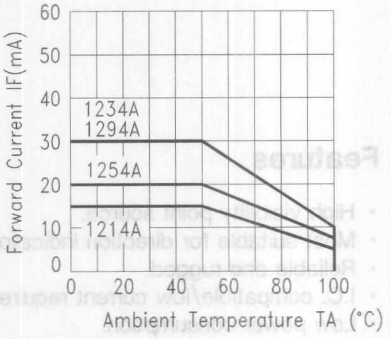


Fig.4 FORWARD CURRENT DERATING CURVE

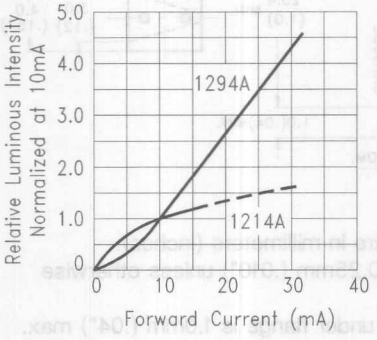


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

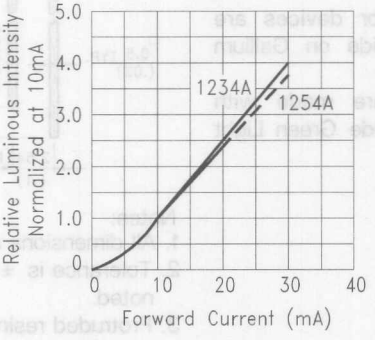


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

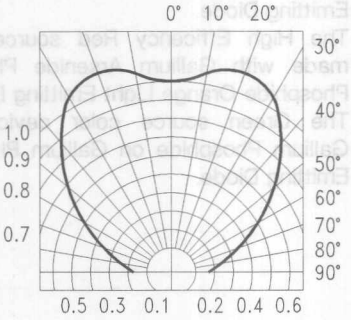


Fig.7 SPATIAL DISTRIBUTION

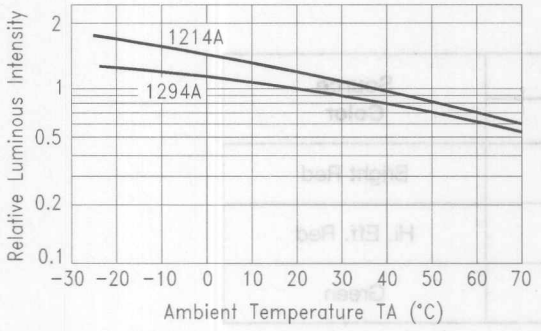


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

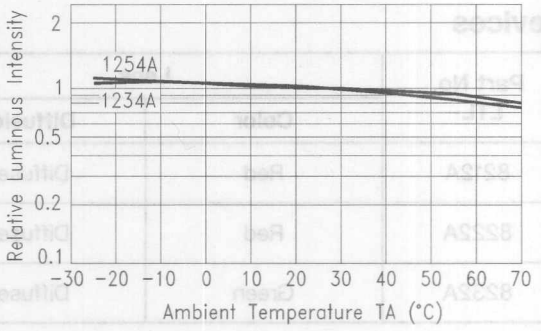


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

Arrow Head Pointers LED Lamps

LTL-8212A Bright Red
LTL-8222A High Efficiency Red
LTL-8232A Green

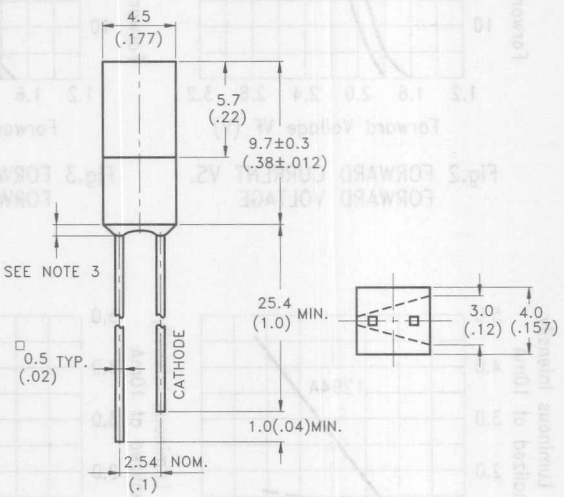
Features

- High visibility point source.
- Most suitable for direction indicator of tape recoder.
- Reliable and rugged.
- I.C. compatible/low current requirements.
- Low power consumption.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.
The High Efficency Red source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
8212A	Red	Diffused	Bright Red
8222A	Red	Diffused	Hi. Eff. Red
8232A	Green	Diffused	Green

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Hi. Eff. Red	Unit
Power Dissipation	40	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	120	mA
Continuous Forward Current	15	30	30	mA
Derating Linear From 50 ℃	0.2	0.4	0.4	mA/ ℃
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃			
Storage Temperature Range	-55 ℃ to +100 ℃			
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds			

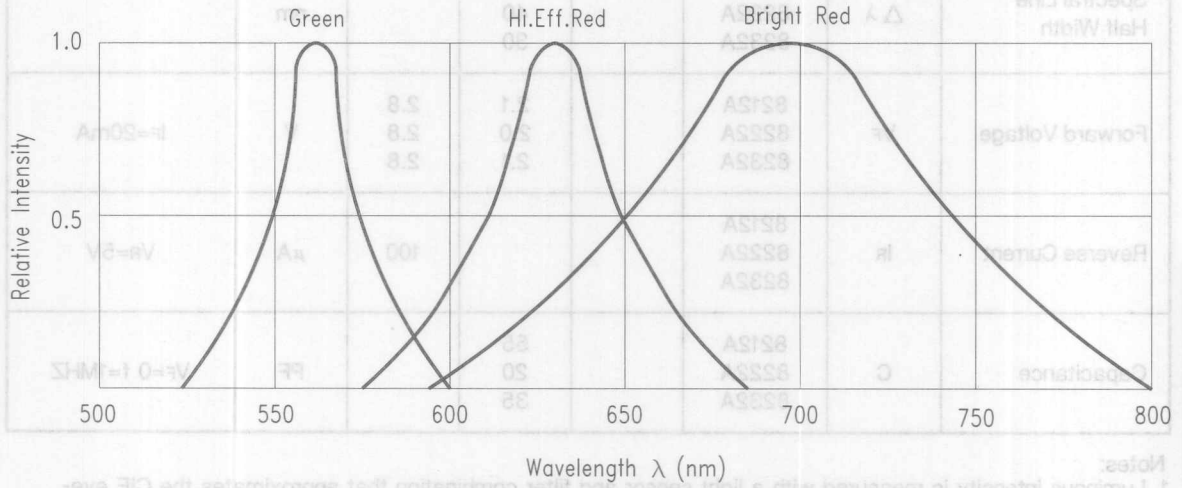


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	8212A 8222A 8232A	0.3 0.7 0.7	0.7 2.5 2.5		mcd	IF=10 mA Note 1
Viewing Angle	2 θ ½	8212A 8222A 8232A		100		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	8212A 8222A 8232A		697 635 565		mm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	8212A 8222A 8232A		657 621 569		nm	Note 3
Spectral Line Half Width	△ λ	8212A 8222A 8232A		90 40 30		nm	
Forward Voltage	VF	8212A 8222A 8232A		2.1 2.0 2.1	2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	8212A 8222A 8232A			100	μA	VR=5V
Capacitance	C	8212A 8222A 8232A		55 20 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

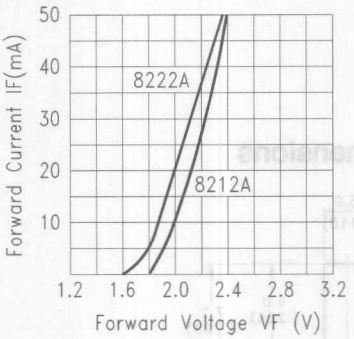


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

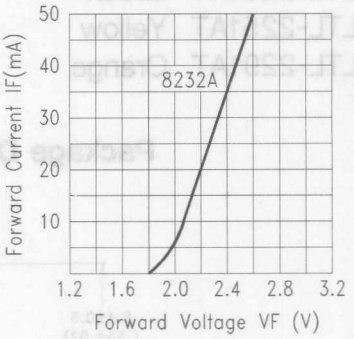


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

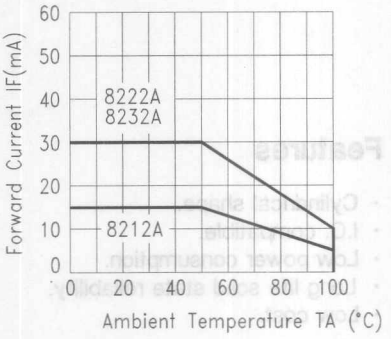


Fig.4 FORWARD CURRENT DERATING CURVE

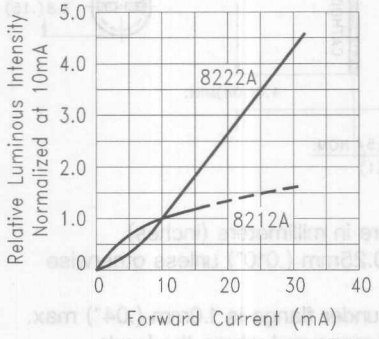


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

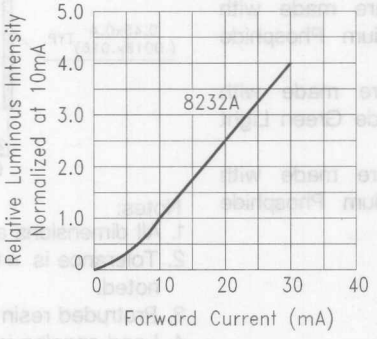


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

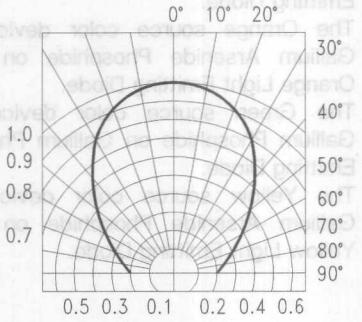


Fig.7 SPATIAL DISTRIBUTION

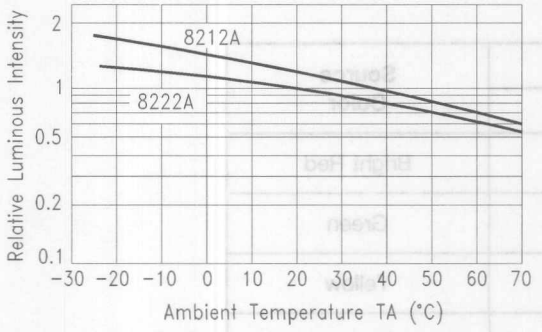


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

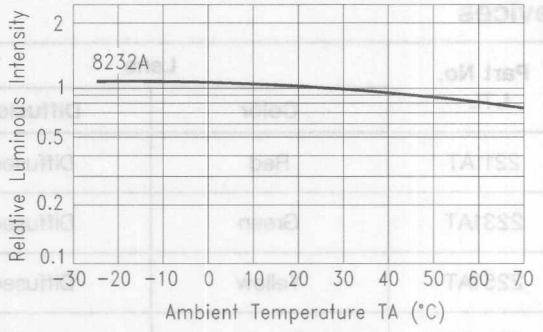


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LITEON

3mm Cylindrical LED Lamps

LTL-2211AT Bright Red
LTL-2231AT Green
LTL-2251AT Yellow
LTL-2291AT Orange

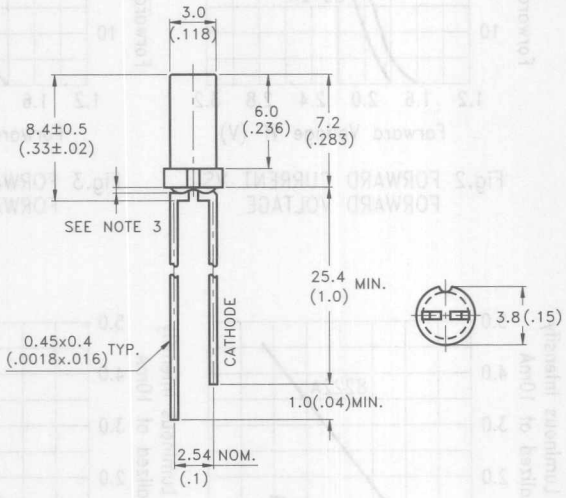
Features

- Cylindrical shape.
- I.C. compatible.
- Low power consumption.
- Long life solid state reliability.
- Low cost.

Description

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
2211AT	Red	Diffused	Bright Red
2231AT	Green	Diffused	Green
2251AT	Yellow	Diffused	Yellow
2291AT	Orange	Diffused	Orange

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Yellow	Orange	Unit
Power Dissipation	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	80	120	mA
Continuous Forward Current	15	30	20	30	mA
Derating Linear From 50 ℃	0.2	0.4	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃				
Storage Temperature Range	-55 ℃ to +100 ℃				
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds				

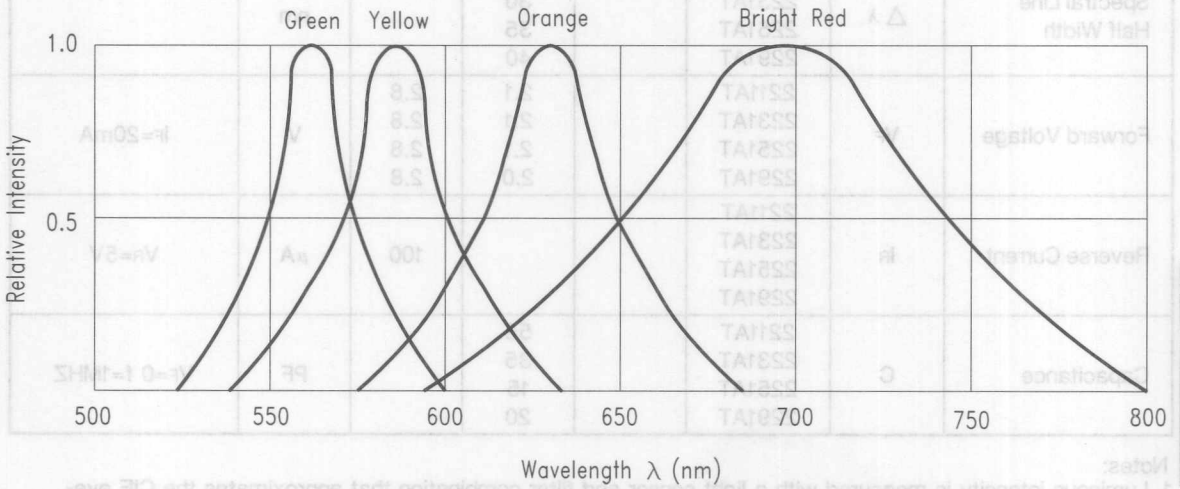


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	2211AT 2231AT 2251AT 2291AT	0.4 0.7 1.1 0.7	1.1 3.7 2.5 2.5		mcd	IF=10 mA Note 1
Viewing Angle	2 θ ½	2211AT 2231AT 2251AT 2291AT		180		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	2211AT 2231AT 2251AT 2291AT		697 565 585 630		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	2211AT 2231AT 2251AT 2291AT		657 569 588 621		nm	Note 3
Spectral Line Half Width	△ λ	2211AT 2231AT 2251AT 2291AT		90 30 35 40		nm	
Forward Voltage	VF	2211AT 2231AT 2251AT 2291AT		2.1 2.1 2.1 2.0	2.8 2.8 2.8 2.8	V	IF=20mA
Reverse Current	IR	2211AT 2231AT 2251AT 2291AT			100	μA	VR=5V
Capacitance	C	2211AT 2231AT 2251AT 2291AT		55 35 15 20		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

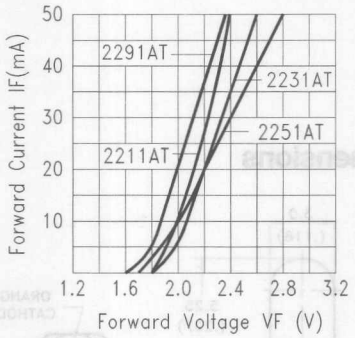


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

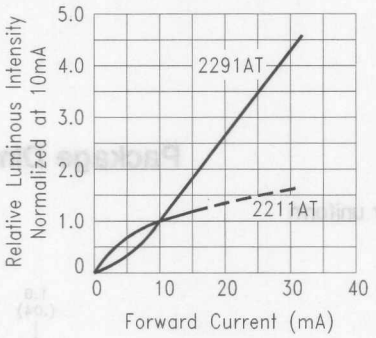


Fig.3 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

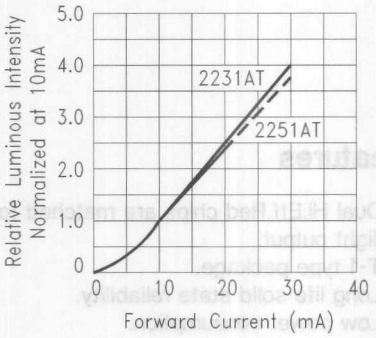


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

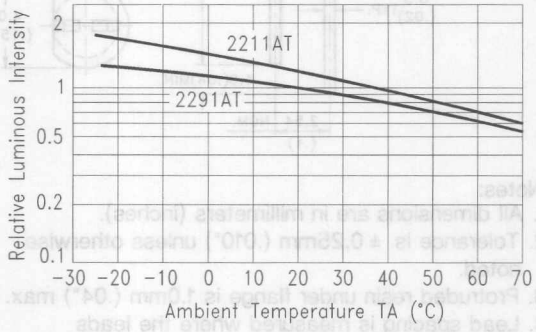


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

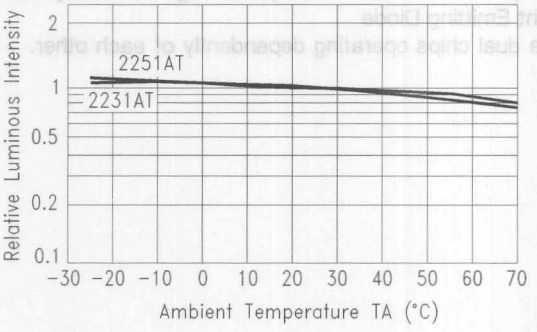


Fig.6 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

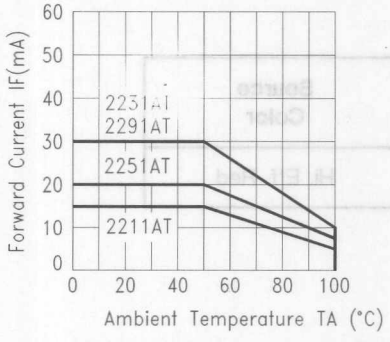


Fig.7 FORWARD CURRENT DERATING CURVE

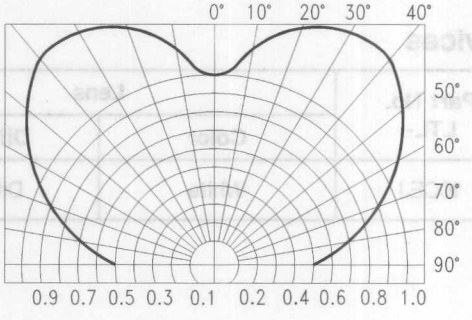


Fig.8 SPATIAL DISTRIBUTION

T-1 (3mm) Bi-Polar Indicator Lamp

LTL- 10CEJ High Efficiency Red

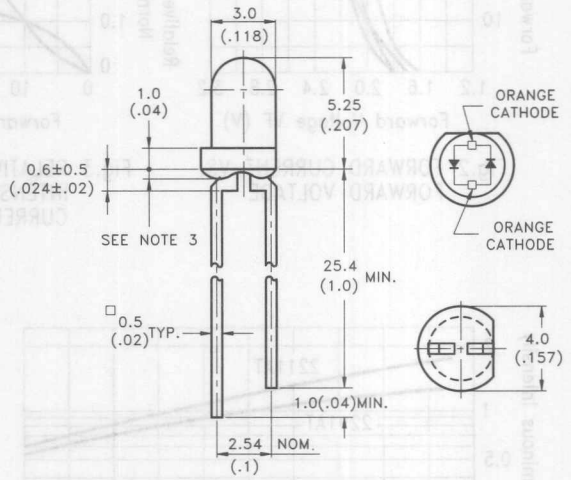
Features

- Dual Hi.Eff.Red chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-10CEJ bipolar lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide High Efficiency Red Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
10CEJ	White	Diffused	Hi. Eff. Red

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Hi. Eff. Red	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	mA
Continuous Forward Current	30	mA
Derating Linear From 50 ℃	0.4	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

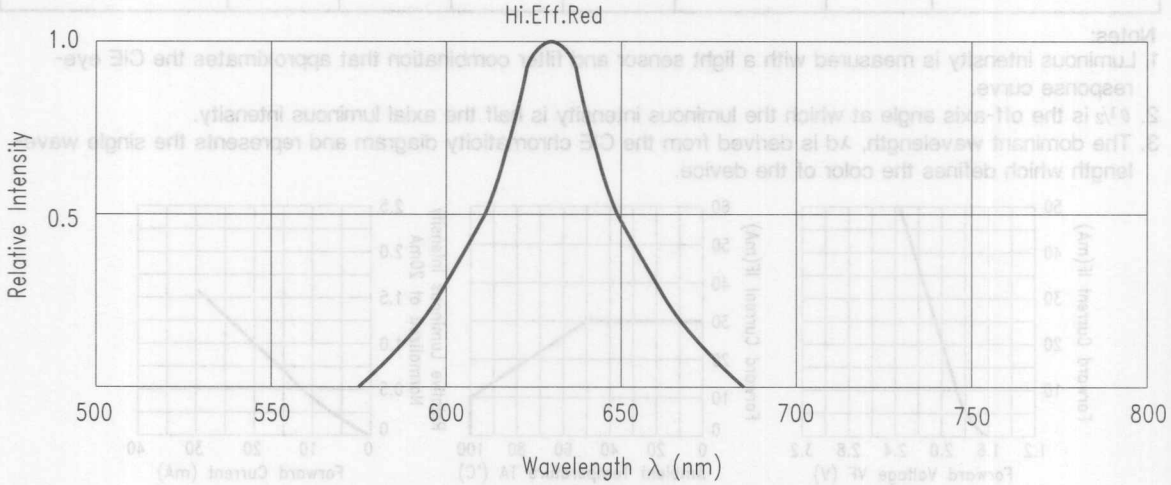


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	10CEJ	1.7	5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	10CEJ		72		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP			635		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd			621		nm	Note 3
Spectral Line Half Width	Δλ			40		nm	
Forward Voltage	VF			2.0	2.8	V	IF=20mA
Reverse Current	IR				100	μA	VR=5V
Capacitance	C			20		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

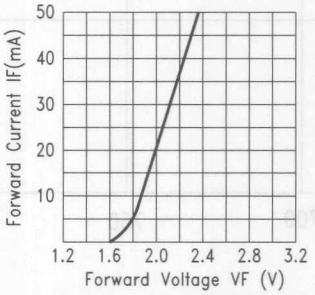


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

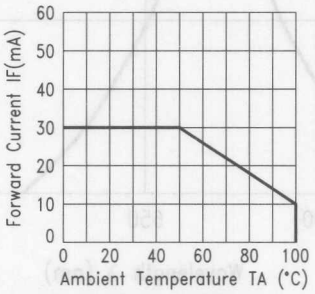


Fig.3 FORWARD CURRENT DERATING CURVE

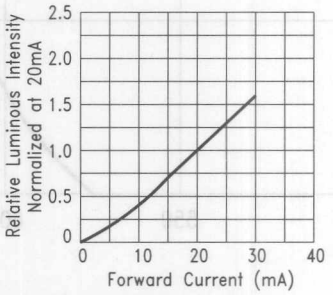


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

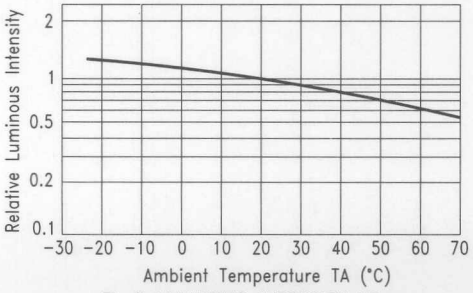


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

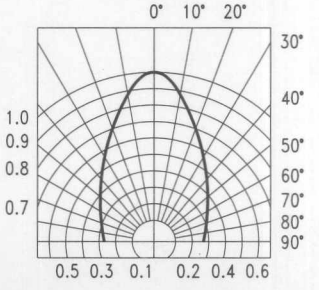


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1 (3mm) Bi-Polar Indicator Lamp

LTL- 10CGJ Dual Green

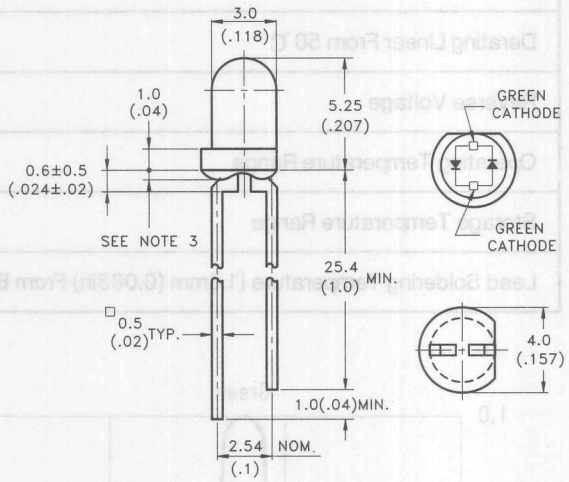
Features

- Dual Green chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-10CGJ bipolar lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
10CGJ	White	Diffused	Green

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	mA
Continuous Forward Current	30	mA
Derating Linear From 50 ℃	0.4	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

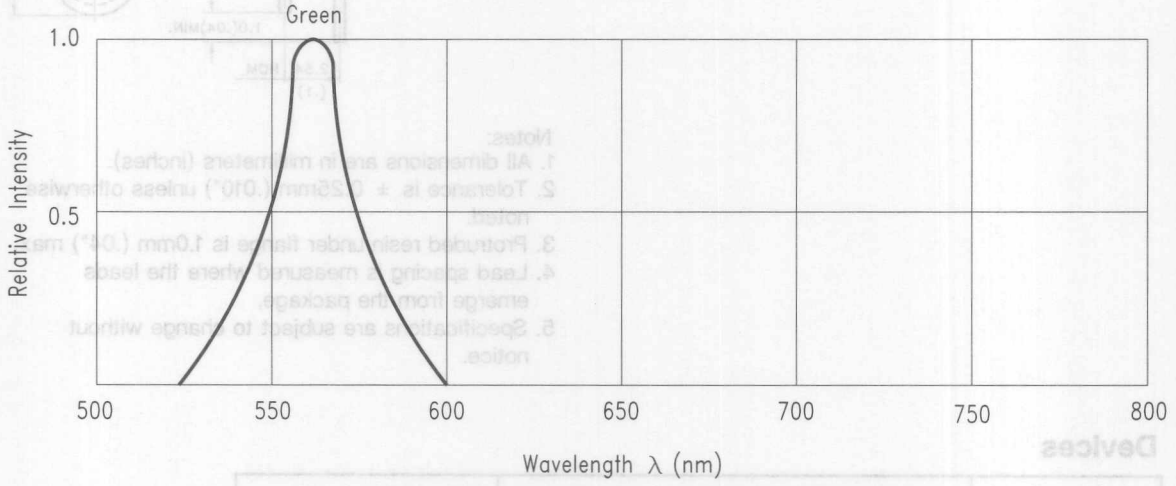


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	10CGJ	1.7	5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	10CGJ		72		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP			565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd			569		nm	Note 3
Spectral Line Half Width	Δ λ			30		nm	
Forward Voltage	VF			2.1	2.8	V	IF=20mA
Reverse Current	IR				100	μA	VR=5V
Capacitance	C			35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

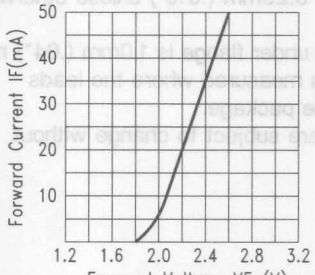


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

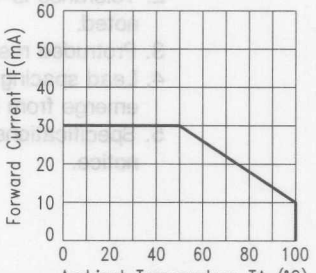


Fig.3 FORWARD CURRENT DERATING CURVE

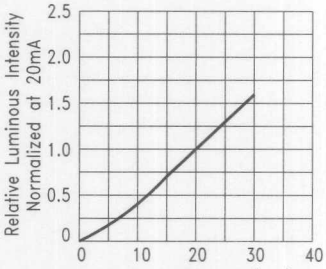


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

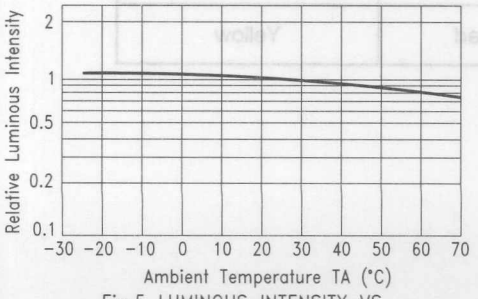


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

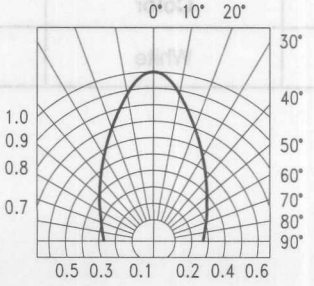


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1 (3mm) Bi-Polar Indicator Lamp

LTL- 10CYJ Yellow

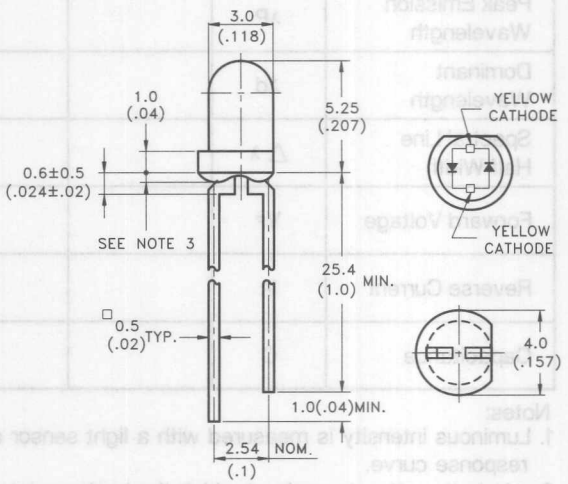
Features

- Dual Yellow chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-10CYJ bipolar lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
10CYJ	White	Diffused	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	mA
Continuous Forward Current	20	mA
Derating Linear From 50 ℃	0.25	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

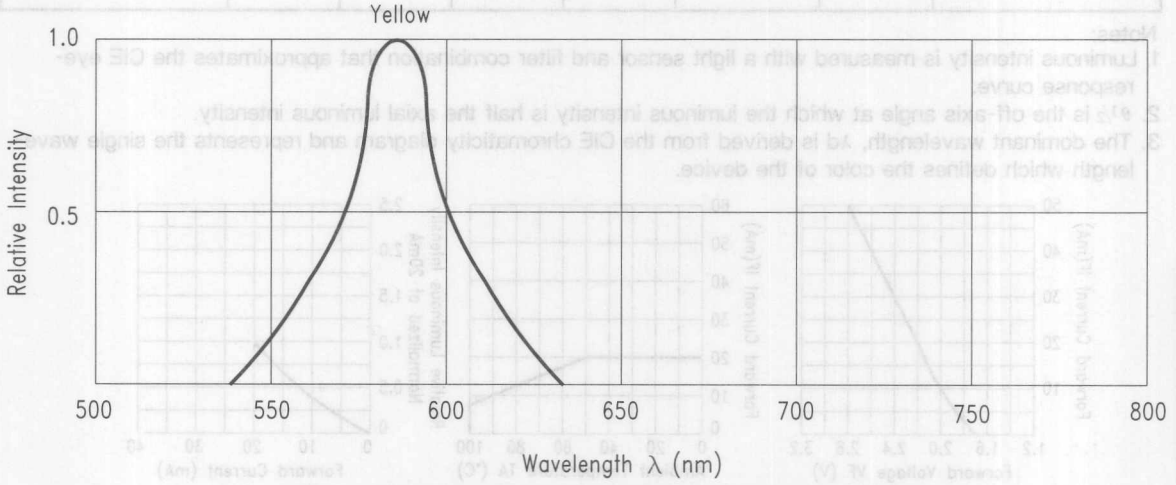


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	10CYJ	1.7	5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	10CYJ		72		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP			585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd			588		nm	Note 3
Spectral Line Half Width	Δ λ			35		nm	
Forward Voltage	VF			2.1	2.8	V	IF=20mA
Reverse Current	IR				100	μA	VR=5V
Capacitance	C			15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

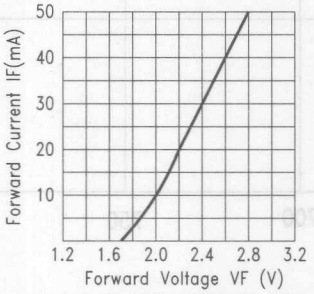


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

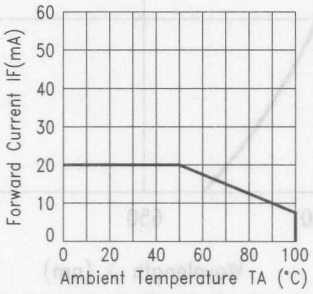


Fig.3 FORWARD CURRENT DERATING CURVE

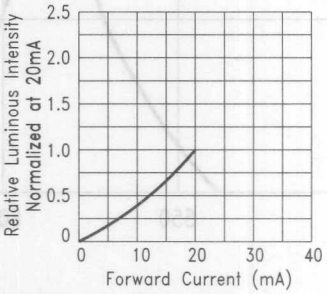


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

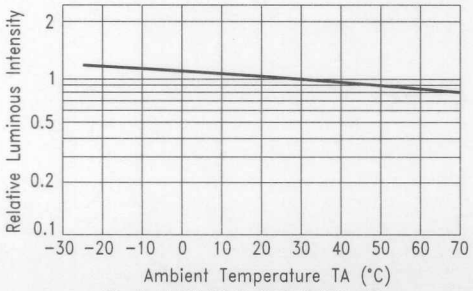


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

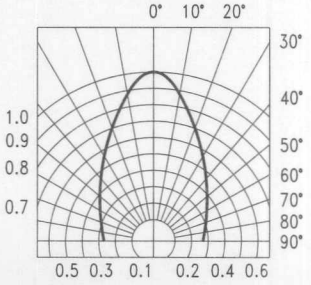


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1 (3mm) Bi-Color Indicator Lamp

LTL- 10CDJ Yellow-Green

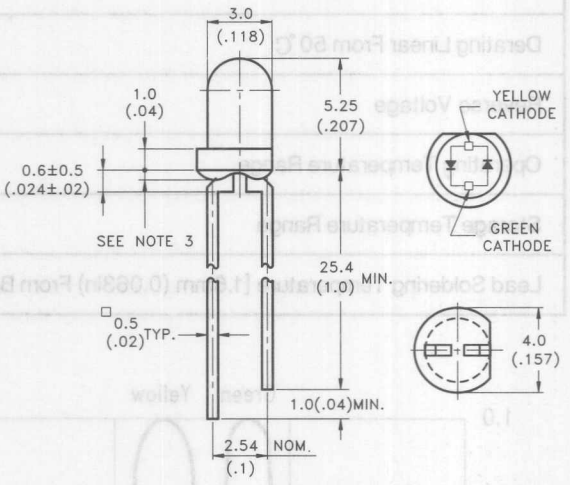
Features

- Yellow and Green chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-10CDJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
10CDJ	White	Diffused	Green
			Yellow

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Yellow	Unit
Power Dissipation	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	80	mA
Continuous Forward Current	30	20	mA
Derating Linear From 50 ℃	0.4	0.25	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

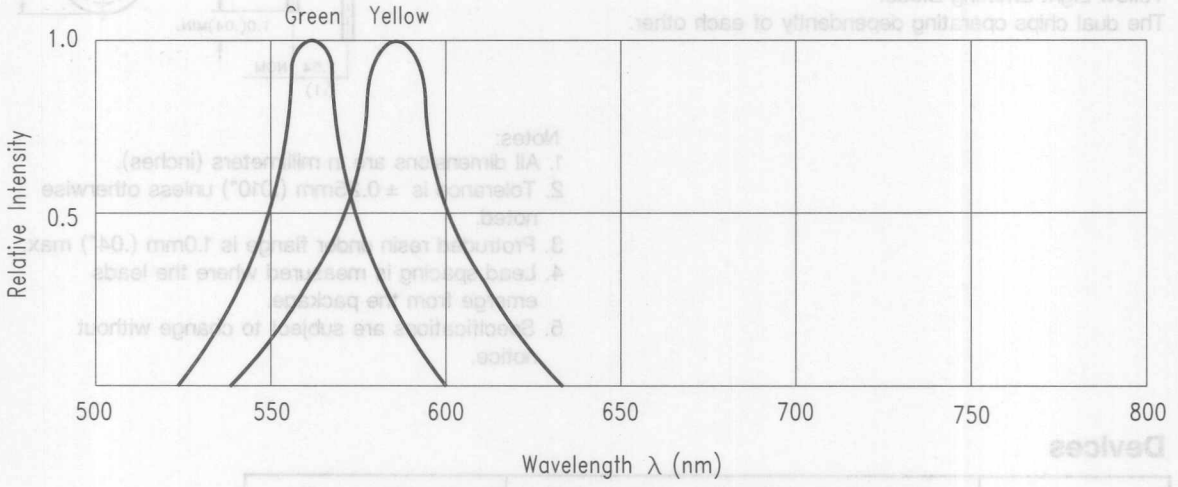


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-10CDJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Green Yellow	1.7 1.7	5.6 5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Green Yellow		72		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Green Yellow		565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Green Yellow		569 588		nm	Note 3
Spectral Line Half Width	Δ λ	Green Yellow		30 35		nm	
Forward Voltage	VF	Green Yellow		2.1	2.8	V	IF=20mA
Reverse Current	IR	Green Yellow			100	μA	VR=5V
Capacitance	C	Green Yellow		35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

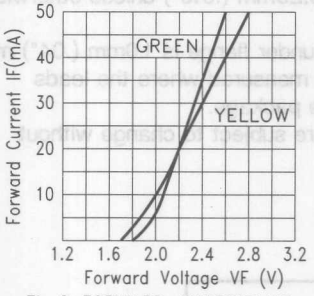


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

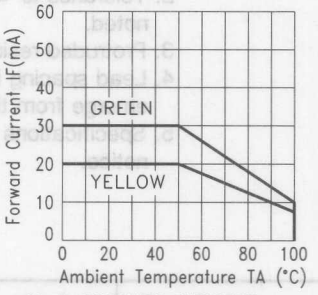


Fig.3 FORWARD CURRENT DERATING CURVE

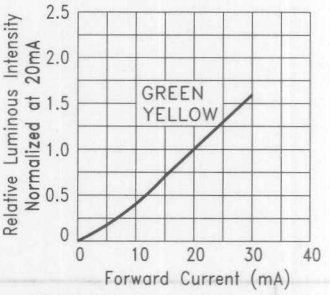


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

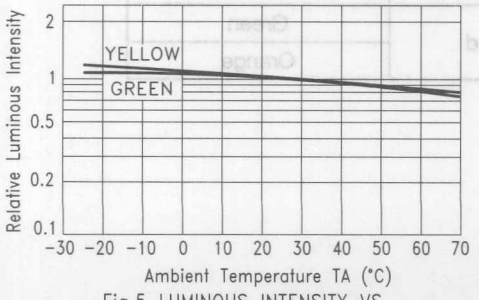


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

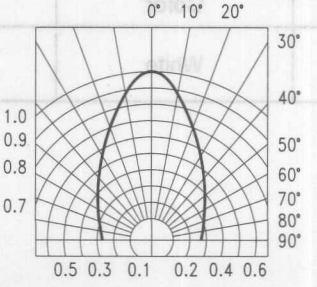


Fig.6 SPATIAL DISTRIBUTION

LITEON T-1 (3mm) Bi-Color Indicator Lamp

LTL- 10CHJ Orange-Green

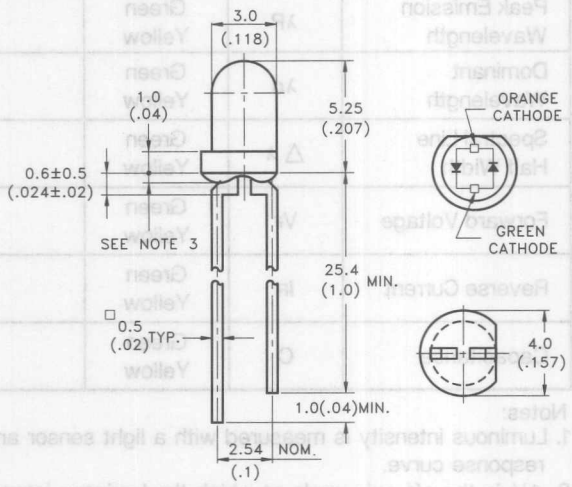
Features

- Orange and green chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-10CHJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode. The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
10CHJ	White	Diffused	Green
			Orange

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Unit
Power Dissipation	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	mA
Continuous Forward Current	30	30	mA
Derating Linear From 50 ℃	0.4	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

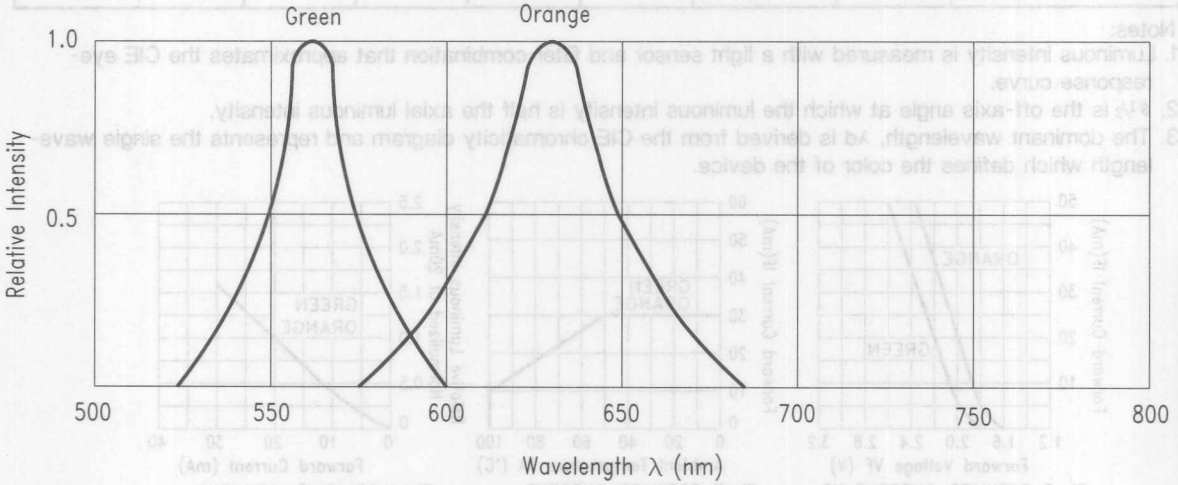


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

LED LAMPS

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-10CHJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Orange Green	1.7 1.7	5.6 5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	Orange Green		72		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Orange Green		630 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Orange Green		621 569		nm	Note 3
Spectral Line Half Width	Δ λ	Orange Green		40 30		nm	
Forward Voltage	VF	Orange Green		2.0 2.1	2.8	V	IF=20mA
Reverse Current	IR	Orange Green			100	μA	VR=5V
Capacitance	C	Orange Green		20 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

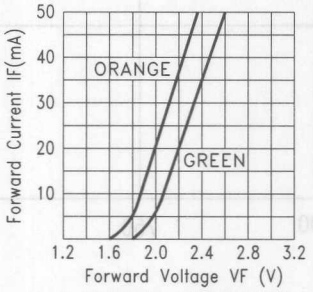


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

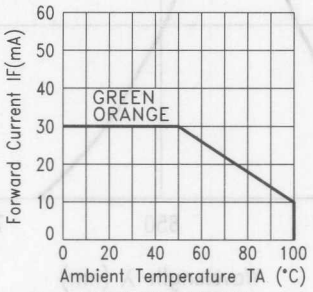


Fig.3 FORWARD CURRENT DERATING CURVE

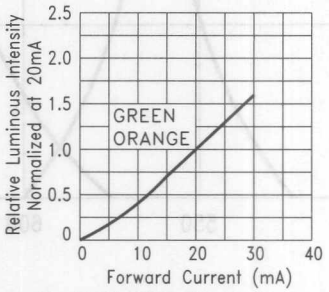


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

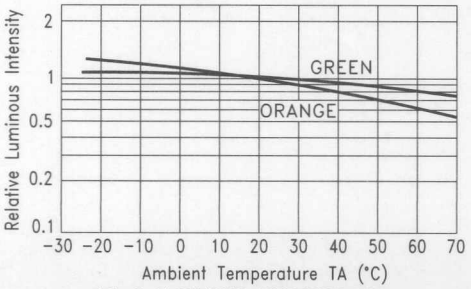


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

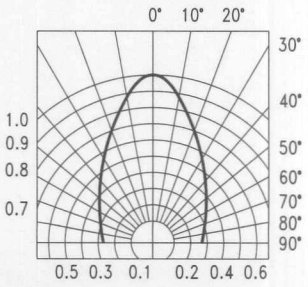


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1 (3mm) Bi-Polar Indicator Lamp

LTL- 14CYJ Yellow

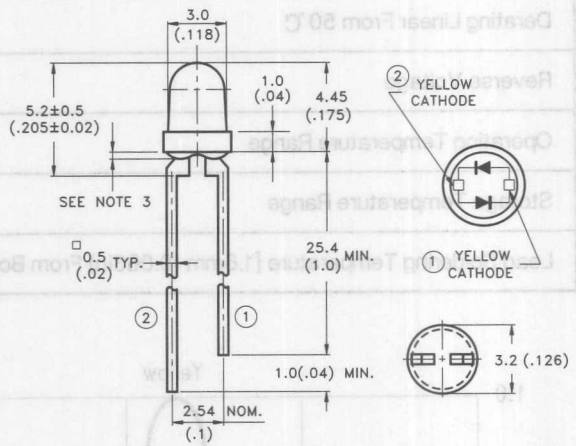
Features

- Dual Yellow chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-14CYJ bipolar lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
14CYJ	White	Diffused	Yellow

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	mA
Continuous Forward Current	20	mA
Derating Linear From 50 ℃	0.25	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

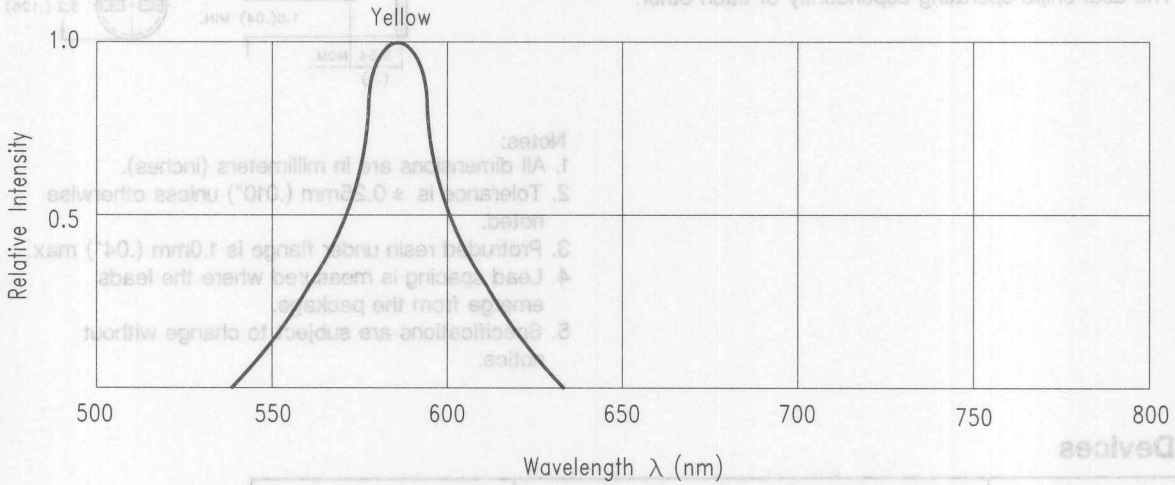


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	14CYJ	2.5	8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	14CYJ		80		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP			585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd			588		nm	Note 3
Spectral Line Half Width	Δ λ			35		nm	
Forward Voltage	VF			2.1	2.8	V	IF=20mA
Reverse Current	IR				100	μA	VR=5V
Capacitance	C			15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

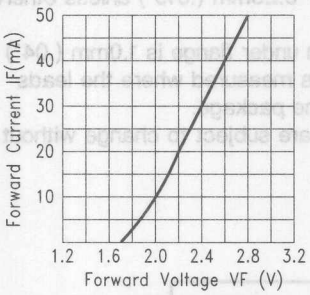


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

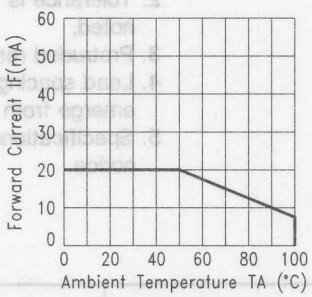


Fig.3 FORWARD CURRENT DERATING CURVE

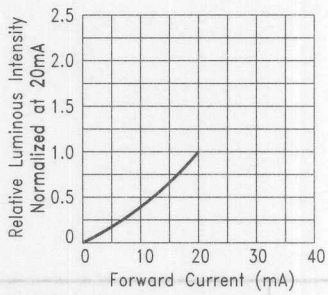


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

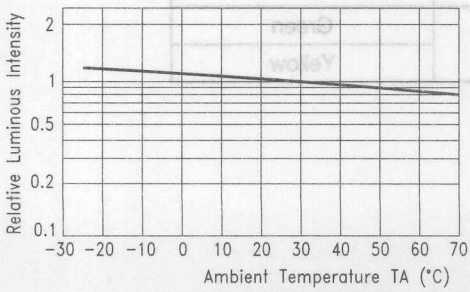


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

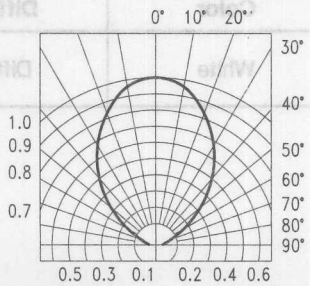


Fig.6 SPATIAL DISTRIBUTION

T-1 (3mm) Bi-Color Indicator Lamp

LTL- 14CDJ Yellow - Green

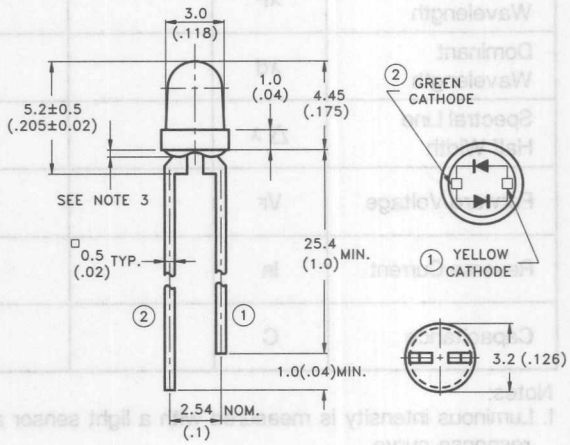
Features

- Yellow and green chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-14CDJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode. The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
14CDJ	White	Diffused	Green
			Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Yellow	Unit
Power Dissipation	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	80	mA
Continuous Forward Current	30	20	mA
Derating Linear From 50 ℃	0.4	0.25	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

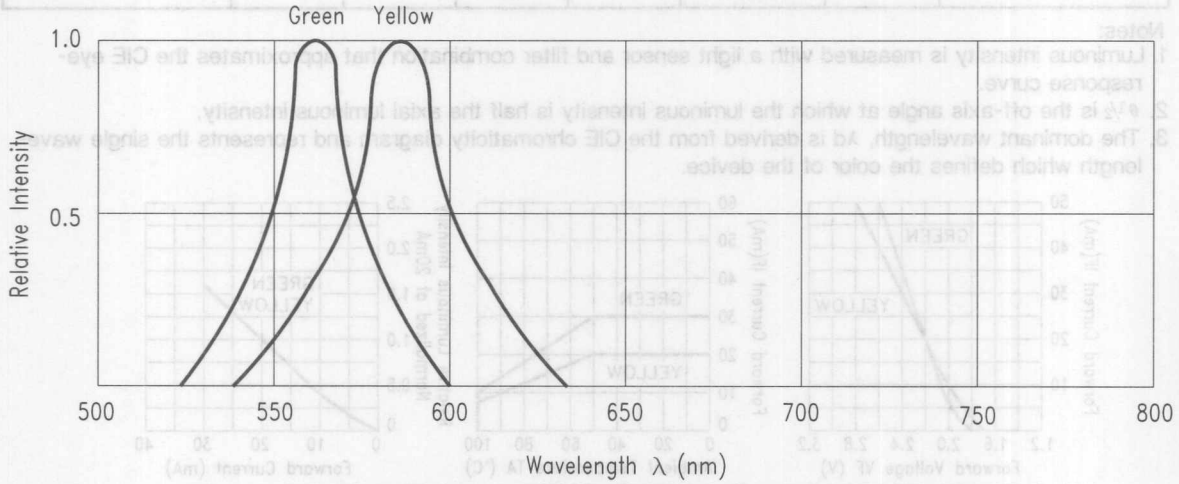


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-14CDJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Green Yellow	3.7 2.5	12.6 8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	Green Yellow		80		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Green Yellow		565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Green Yellow		569 588		nm	Note 3
Spectral Line Half Width	△λ	Green Yellow		30 35		nm	
Forward Voltage	VF	Green Yellow		2.1	2.8	V	IF=20mA
Reverse Current	IR	Green Yellow			100	μA	VR=5V
Capacitance	C	Green Yellow		35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

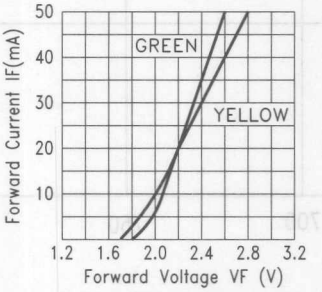


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

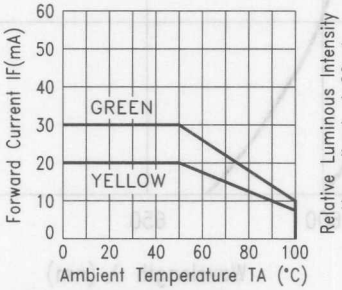


Fig.3 FORWARD CURRENT DERATING CURVE

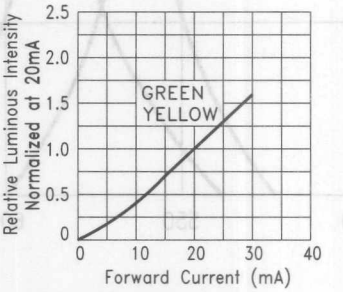


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

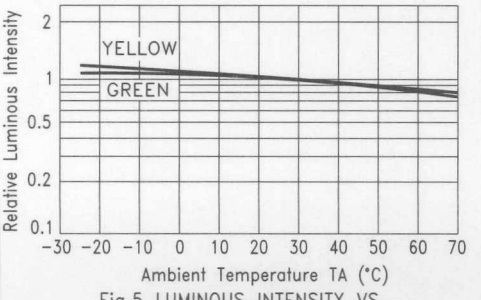


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

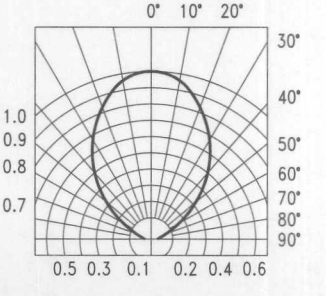


Fig.6 SPATIAL DISTRIBUTION

T-1 (3mm)Bi-Color Indicator Lamp

LTL- 14CHJ Orange - Green

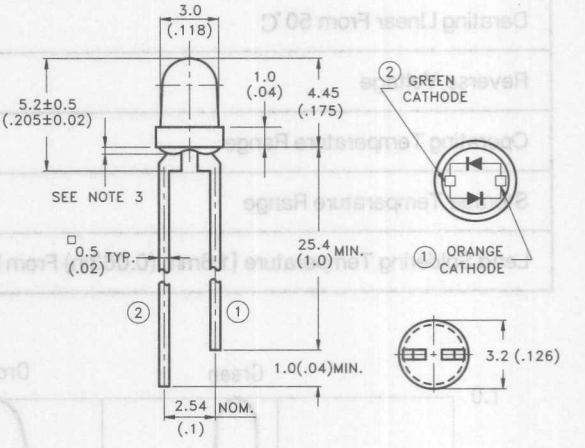
Features

- Orange and green chips are matched for uniform light output.
- T-1 type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-14CHJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode. The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
14CHJ	White	Diffused	Green
			Orange

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Unit
Power Dissipation	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	mA
Continuous Forward Current	30	30	mA
Derating Linear From 50 ℃	0.4	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

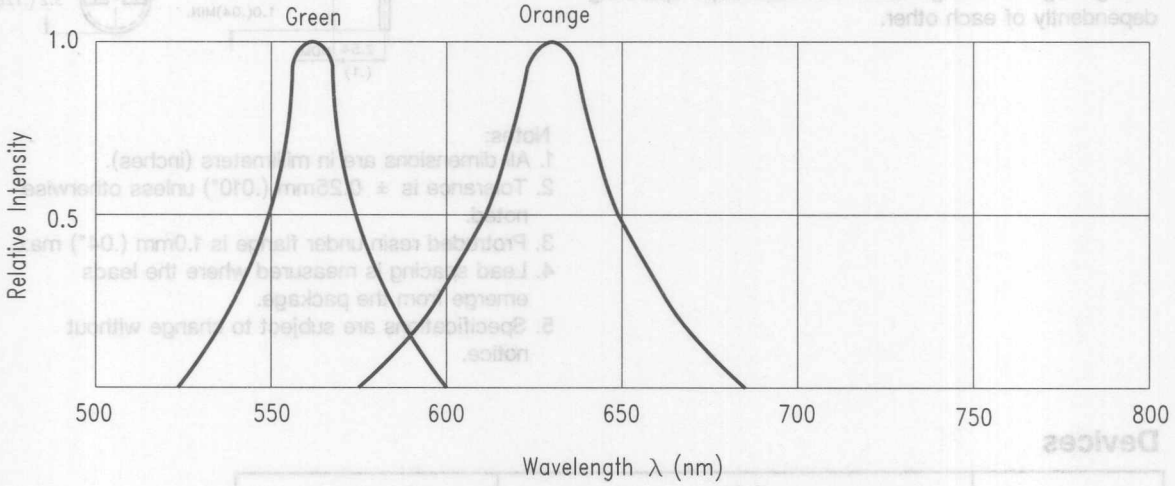


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-14CHJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Orange Green	2.2 2.2	4.8 4.8		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	Orange Green		200		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Orange Green		630 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Orange Green		621 569		nm	Note 3
Spectral Line Half Width	Δ λ	Orange Green		40 30		nm	
Forward Voltage	VF	Orange Green		2.0 2.1	2.8	V	IF=20mA
Reverse Current	IR	Orange Green			100	μA	VR=5V
Capacitance	C	Orange Green		20 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

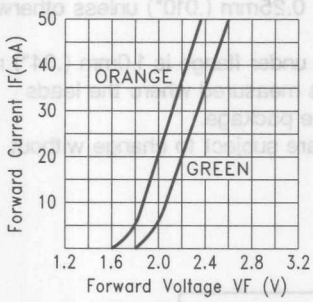


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

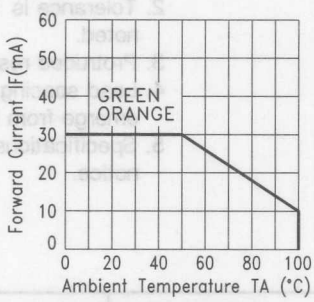


Fig.3 FORWARD CURRENT DERATING CURVE

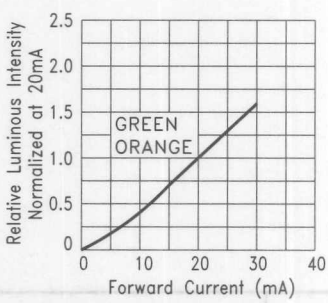


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

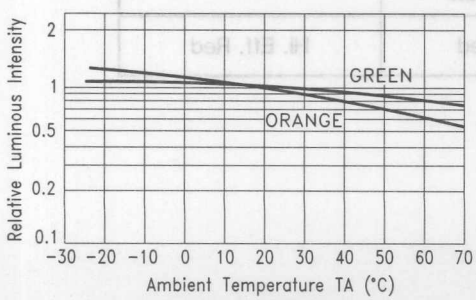


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

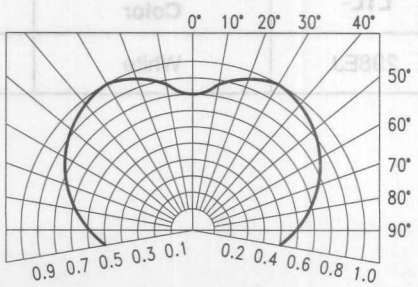


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Bi-Polar Indicator Lamp

LTL- 298EJ High Efficiency Red

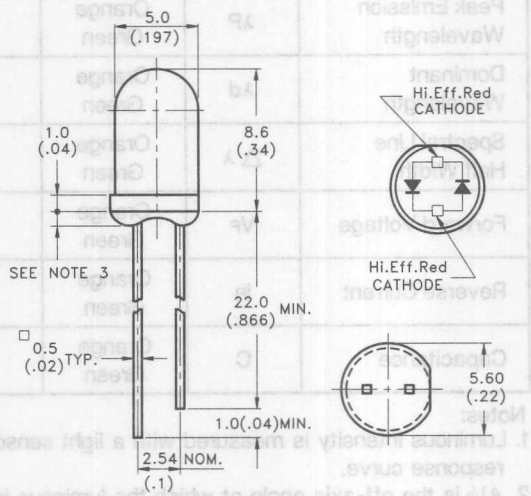
Features

- Dual Hi.Eff.Red chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-298EJ bipolar lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide High Efficiency Red Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
298EJ	White	Diffused	Hi. Eff. Red

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Hi. Eff. Red	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	mA
Continuous Forward Current	30	mA
Derating Linear From 50 ℃	0.4	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

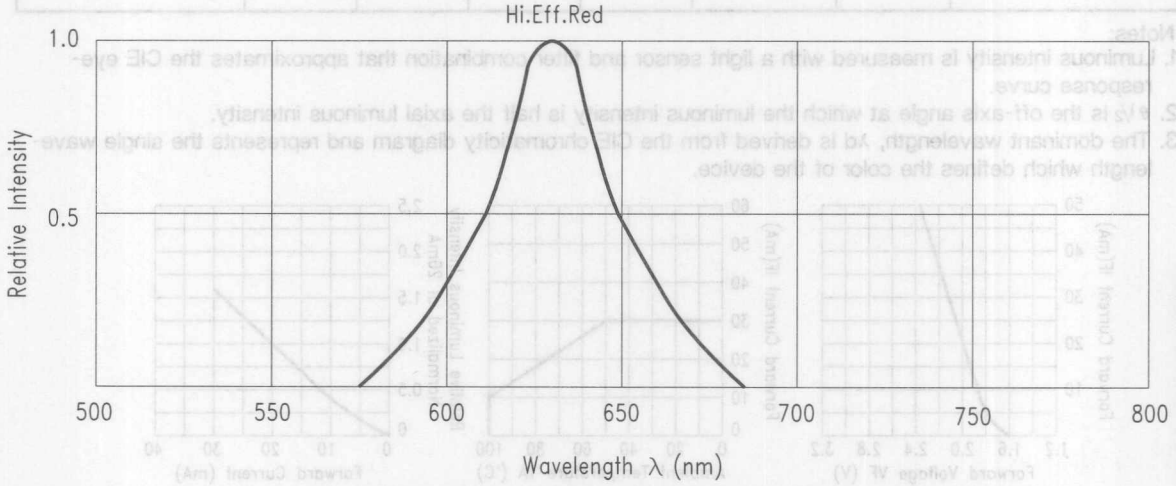


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	298EJ	2.5	8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	298EJ		50		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP			635		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd			621		nm	Note 3
Spectral Line Half Width	Δ λ			40		nm	
Forward Voltage	VF			2.0	2.8	V	IF=20mA
Reverse Current	IR				100	μA	VR=5V
Capacitance	C			20		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

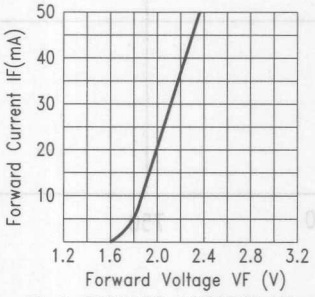


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

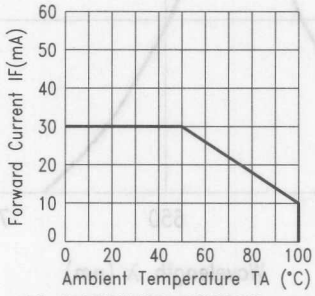


Fig.3 FORWARD CURRENT DERATING CURVE

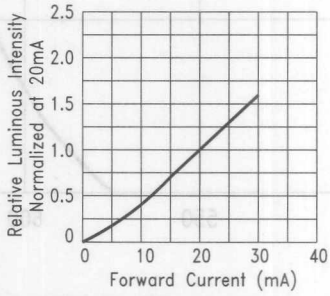


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

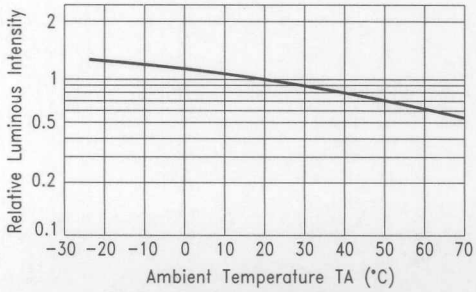


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

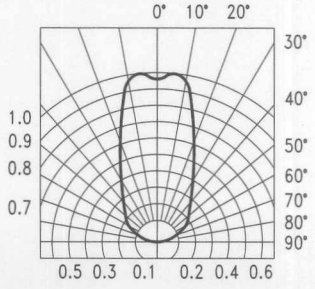


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Bi-Polar Indicator Lamp

LTL- 298GJ Green

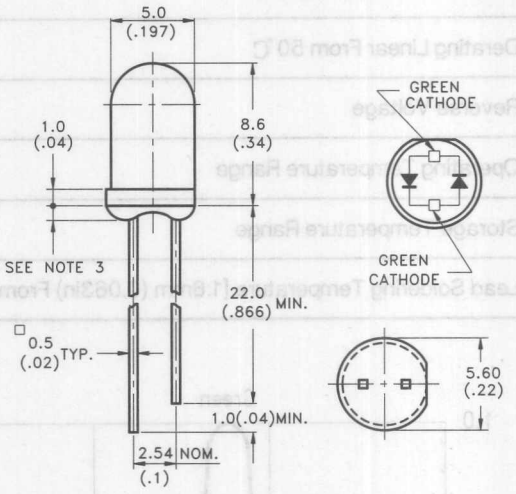
Features

- Dual Green chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-298GJ bipolar lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
298GJ	White	Diffused	Green

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	mA
Continuous Forward Current	30	mA
Derating Linear From 50 ℃	0.4	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

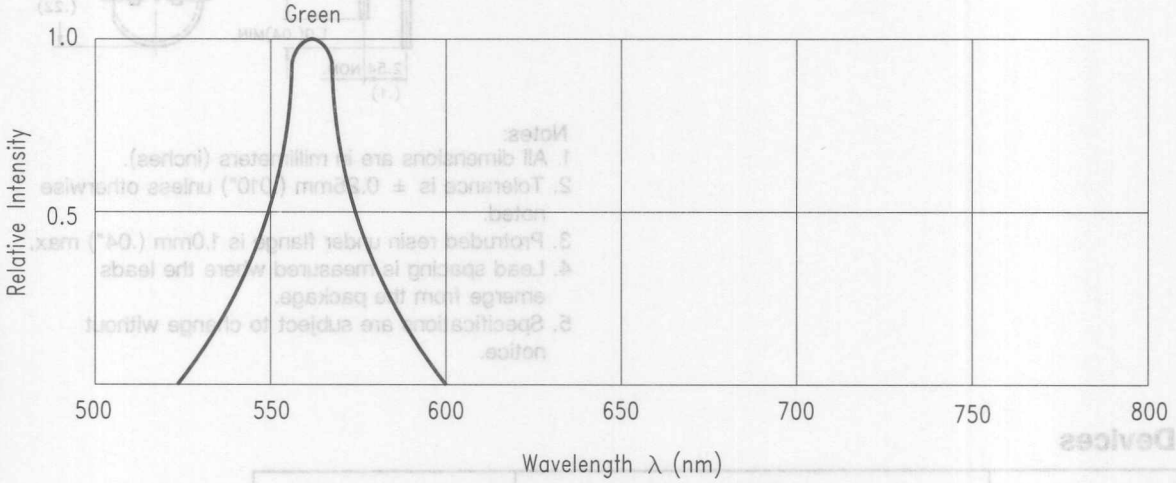


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	298GJ	4.8	10.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	298GJ		50		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP			565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd			569		nm	Note 3
Spectral Line Half Width	△λ			30		nm	
Forward Voltage	VF			2.1	2.8	V	IF=20mA
Reverse Current	IR				100	μA	VR=5V
Capacitance	C			35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

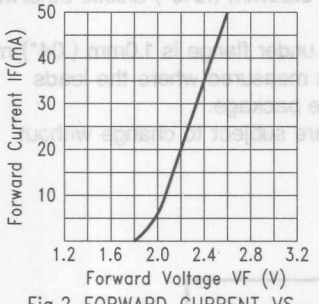


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

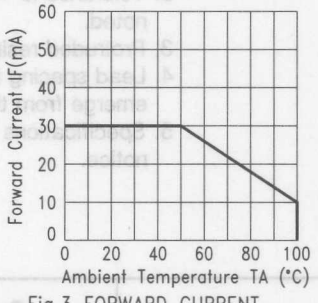


Fig.3 FORWARD CURRENT DERATING CURVE

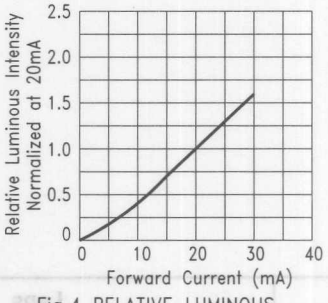


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

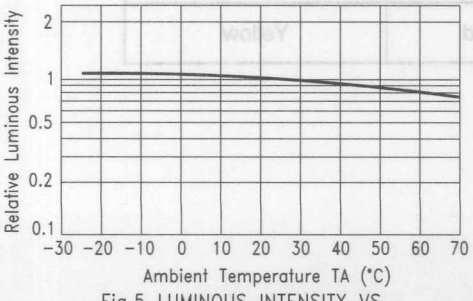


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

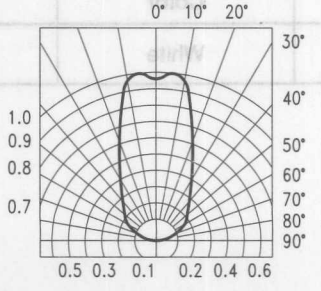


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Bi-Polar Indicator Lamp

LTL- 298YJ Yellow

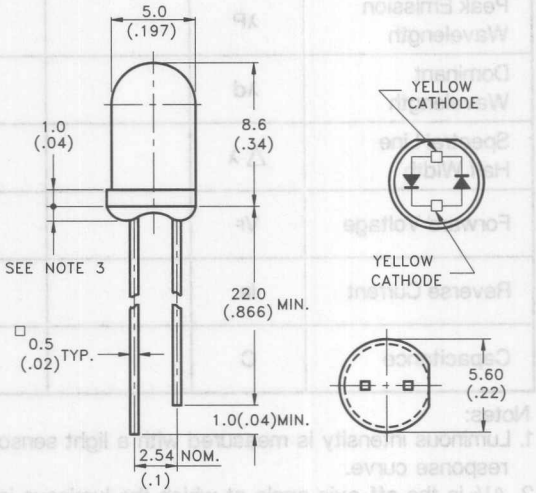
Features

- Dual Yellow chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-298YJ bipolar lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
298YJ	White	Diffused	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Unit
Power Dissipation	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	mA
Continuous Forward Current	20	mA
Derating Linear From 50 ℃	0.25	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

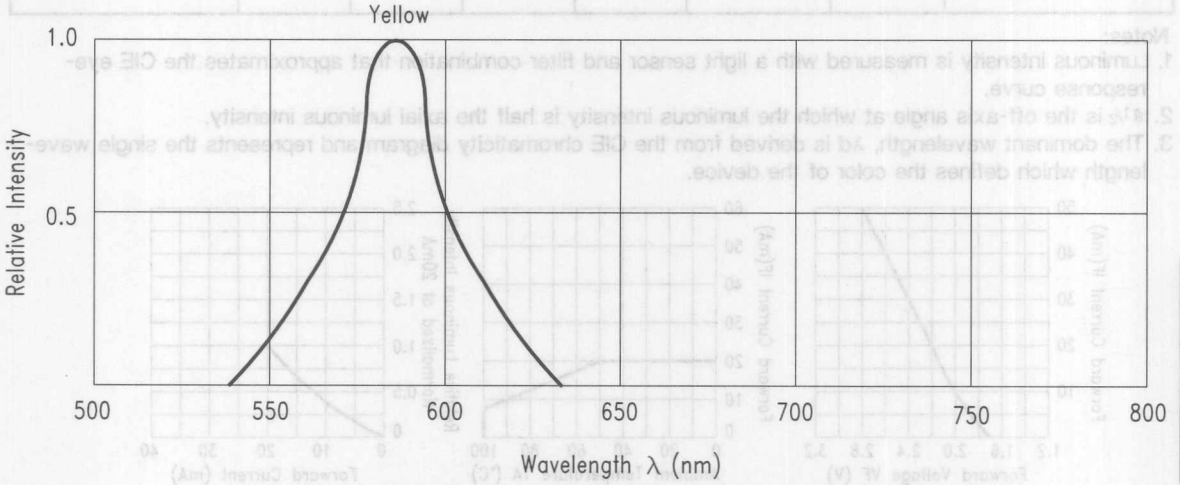


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	298YJ	2.5	8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	298YJ		50		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP			585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd			588		nm	Note 3
Spectral Line Half Width	Δ λ			35		nm	
Forward Voltage	VF			2.1	2.8	V	IF=20mA
Reverse Current	IR				100	μA	VR=5V
Capacitance	C			15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

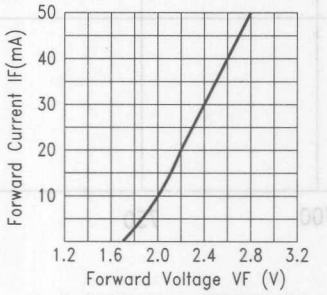


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

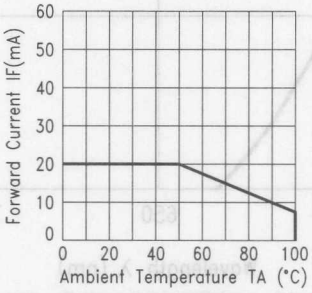


Fig.3 FORWARD CURRENT DERATING CURVE

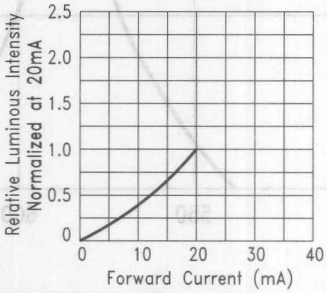


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

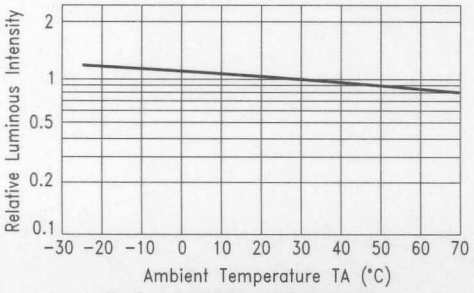


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

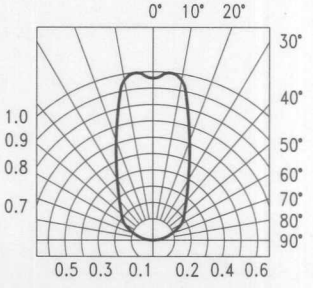


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Bi-Color Indicator Lamp

LTL- 298DJ Yellow - Green

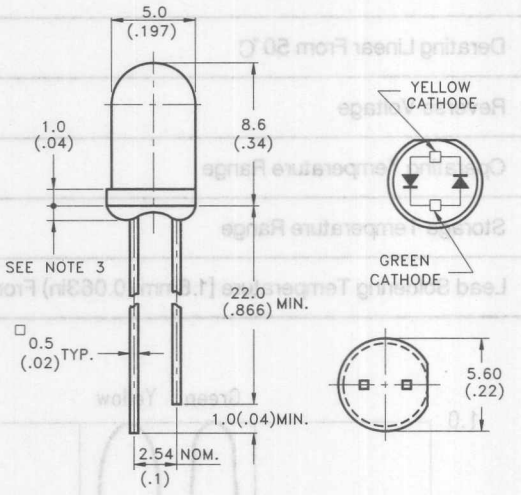
Features

- Yellow and green chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Green/Yellow LTL-298DJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode. The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
298DJ	White	Diffused	Green
			Yellow

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Green	Unit
Power Dissipation	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	120	mA
Continuous Forward Current	20	30	mA
Derating Linear From 50 ℃	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

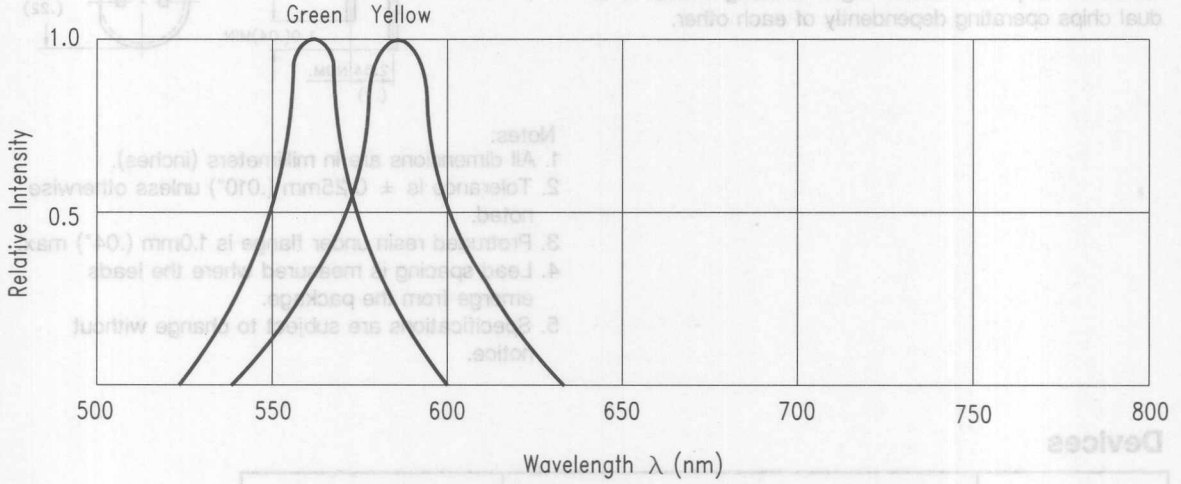


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-298DJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Green Yellow	2.5 2.5	8.7 8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Green Yellow		50		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Green Yellow		565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Green Yellow		569 588		nm	Note 3
Spectral Line Half Width	△λ	Green Yellow		30 35		nm	
Forward Voltage	VF	Green Yellow		2.1	2.8	V	IF=20mA
Reverse Current	IR	Green Yellow			100	μA	VR=5V
Capacitance	C	Green Yellow		35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

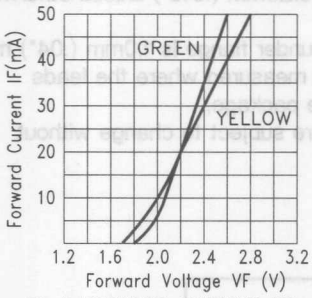


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

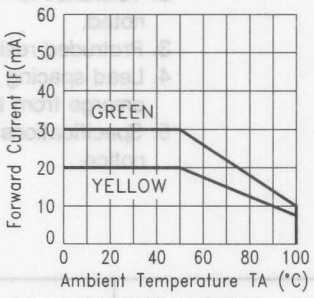


Fig.3 FORWARD CURRENT DERATING CURVE

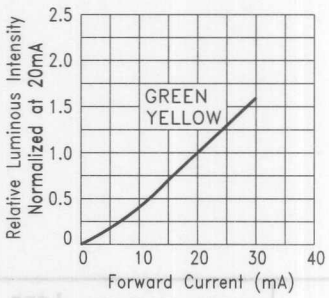


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

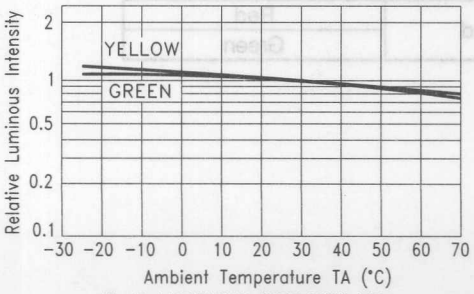


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

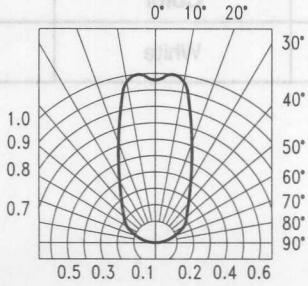


Fig.6 SPATIAL DISTRIBUTION

LED LAMPS

LITEON

T-1¾ (5mm) Bi-Color Indicator Lamp

LTL- 298VJ Red - Green

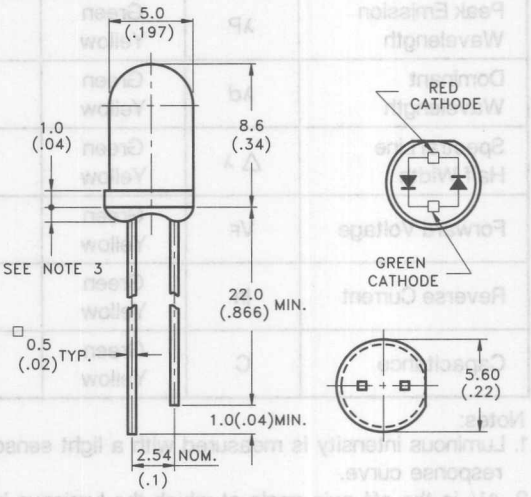
Features

- Red and Green chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Red/Green LTL-298VJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide Red Light Emitting Diode and Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
298VJ	White	Diffused	Red
			Green

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Green	Unit
Power Dissipation	80	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	120	mA
Continuous Forward Current	40	30	mA
Derating Linear From 50 ℃	0.5	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

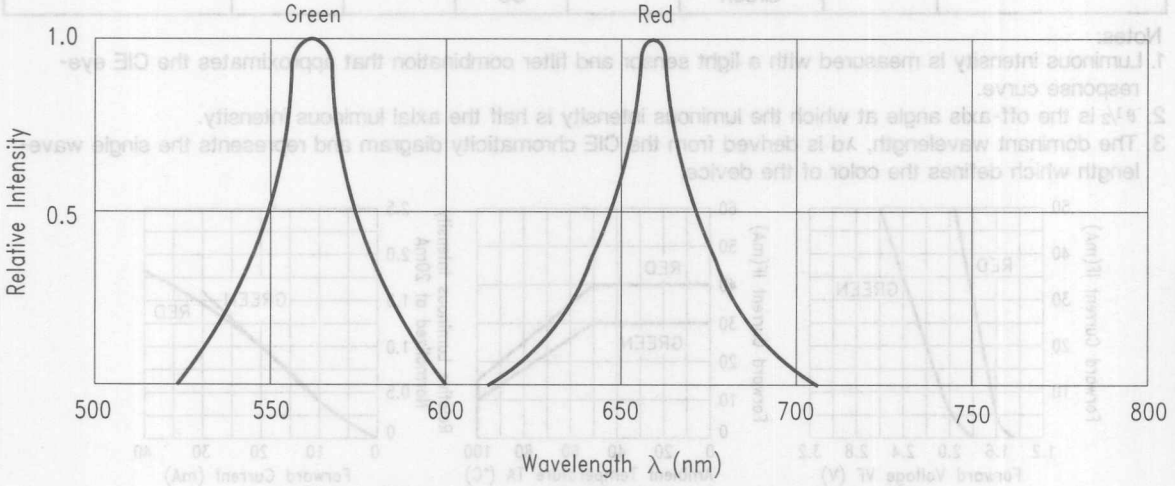


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-298VJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Red Green	0.4 2.5	1.2 8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	Red Green		50		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Red Green		655 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Red Green		651 569		nm	Note 3
Spectral Line Half Width	Δ λ	Red Green		24 30		nm	
Forward Voltage	VF	Red Green		1.7 2.1	2.0 2.8	V	IF=20mA
Reverse Current	IR	Red Green			100	μA	VR=5V
Capacitance	C	Red Green		30 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

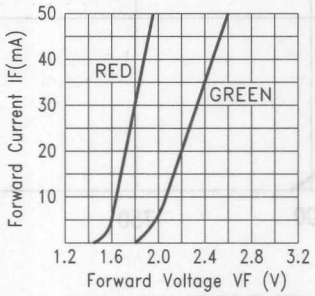


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

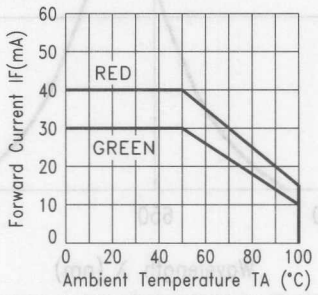


Fig.3 FORWARD CURRENT DERATING CURVE

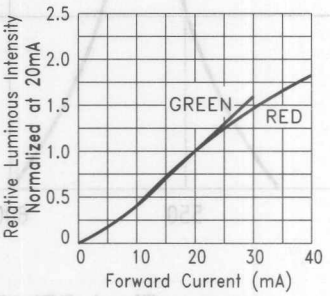


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

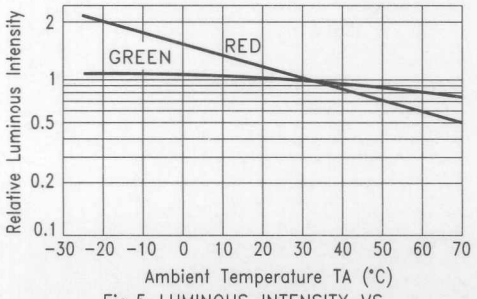


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

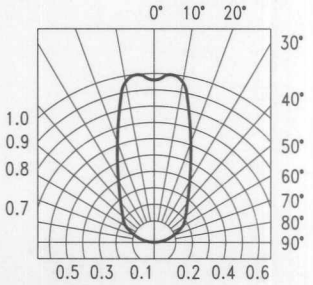


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Bi-Color Indicator Lamp

LTL- 298WJ Orange - Green

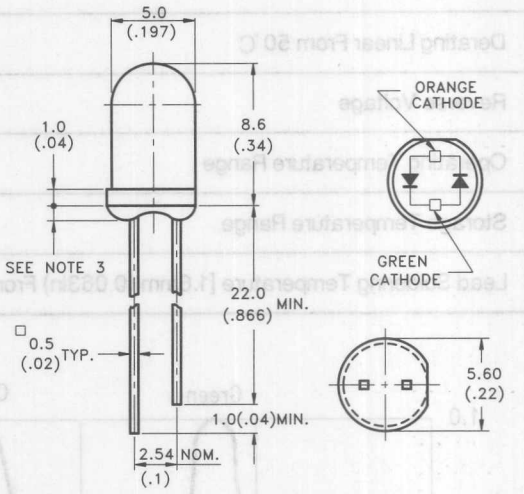
Features

- Orange and Green chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Green/Orange LTL-298WJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.
The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
298WJ	White	Diffused	Green
			Orange

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Unit
Power Dissipation	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	mA
Continuous Forward Current	30	30	mA
Derating Linear From 50 ℃	0.4	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

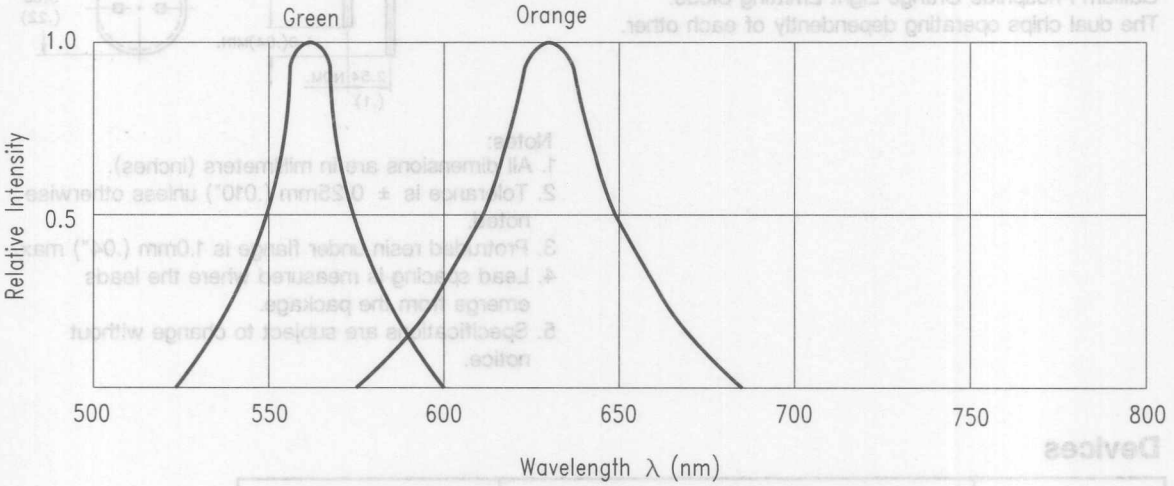


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-298WJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Orange Green	2.5 2.5	8.7 8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Orange Green		50		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Orange Green		630 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Orange Green		621 569		nm	Note 3
Spectral Line Half Width	Δ λ	Orange Green		40 30		nm	
Forward Voltage	VF	Orange Green		2.0 2.1	2.8	V	IF=20mA
Reverse Current	IR	Orange Green			100	μA	VR=5V
Capacitance	C	Orange Green		20 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

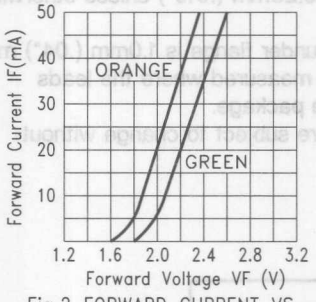


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

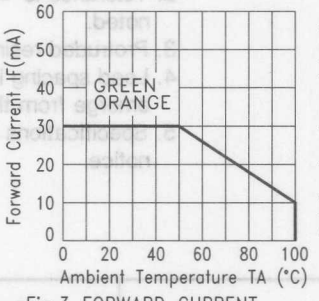


Fig.3 FORWARD CURRENT DERATING CURVE

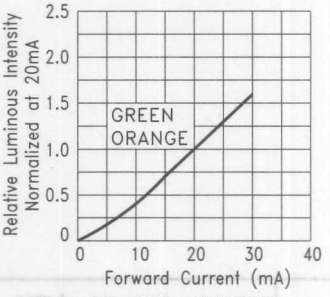


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

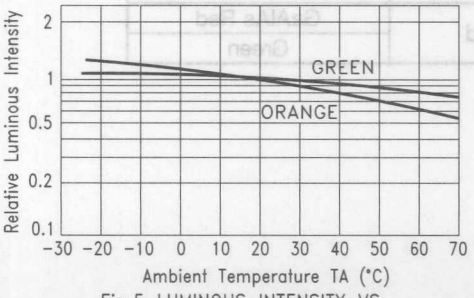


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

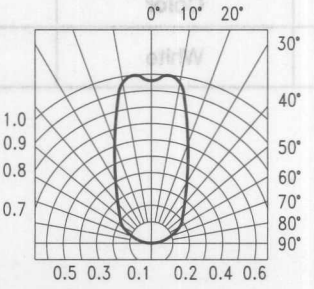


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Bi-Color Indicator Lamp

LTL- 293SJ GaAlAs Red-Green

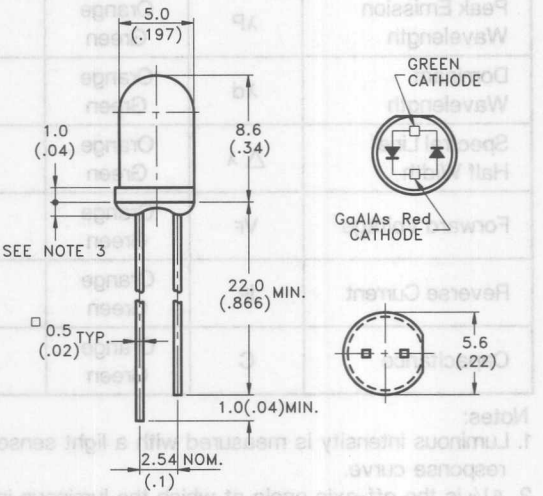
Features

- Ultra-brightness chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Red/Green LTL-293SJ bicolor lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Aluminum Arsenide Ultra-brightness Red Light Emitting Diode and Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The dual chips operating dependently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
293SJ	White	Diffused	GaAlAs Red Green

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	GaAlAs Red	Unit
Power Dissipation	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	200	mA
Continuous Forward Current	30	40	mA
Derating Linear From 50 ℃	0.4	0.5	mA/ ℃
Reverse Voltage	5	4	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

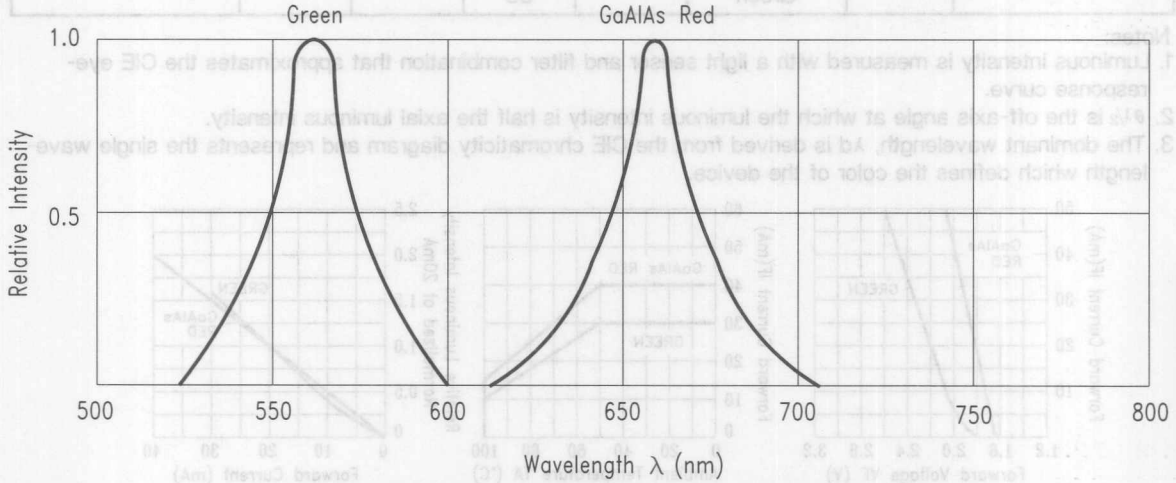


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-293SJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	GaAlAs Red Green	29 12.6	90 40		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	GaAlAs Red Green		60		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	GaAlAs Red Green		660 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	GaAlAs Red Green		638 569		nm	Note 3
Spectral Line Half Width	Δλ	GaAlAs Red Green		20 30		nm	
Forward Voltage	VF	GaAlAs Red Green		1.8 2.1	2.4 2.8	V	IF=20mA
Reverse Current	IR	GaAlAs Red Green			100 100	μA	VR=4V VR=5V
Capacitance	C	GaAlAs Red Green		30 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

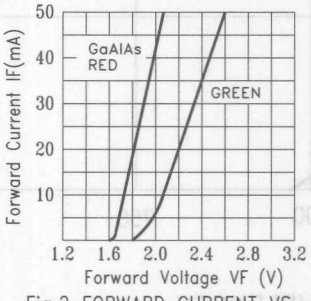


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

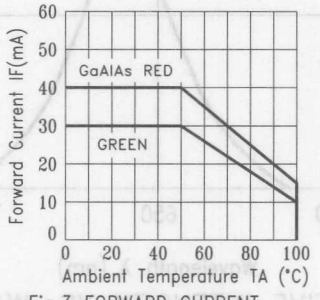


Fig.3 FORWARD CURRENT DERATING CURVE

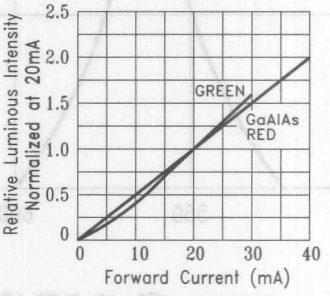


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

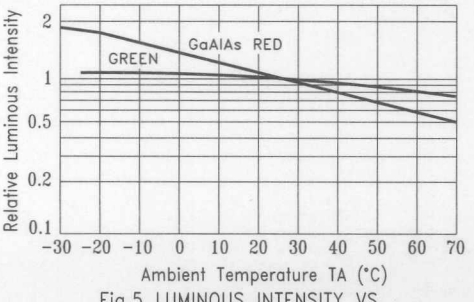


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

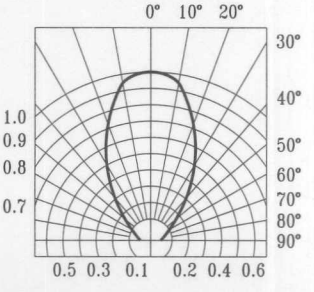


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Dual Color Indicator Lamp

LTL- 30EDJ Yellow - Green

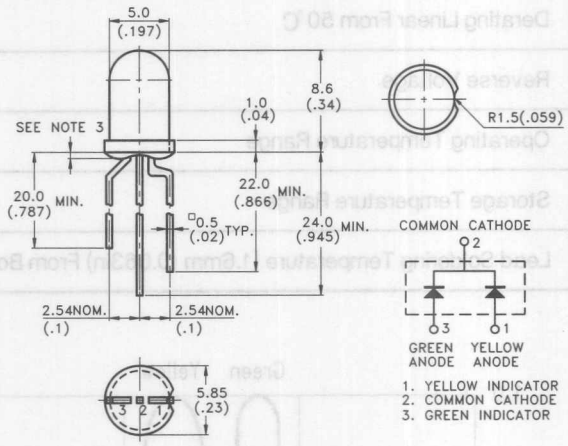
Features

- Yellow and Green chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Green/Yellow LTL-30EDJ dual color lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode. The Yellow and the Green chip with a common cathode operating independently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
30EDJ	White	Diffused	Green
			Yellow

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Green	Unit
Power Dissipation	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	120	mA
Continuous Forward Current	20	30	mA
Derating Linear From 50 ℃	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

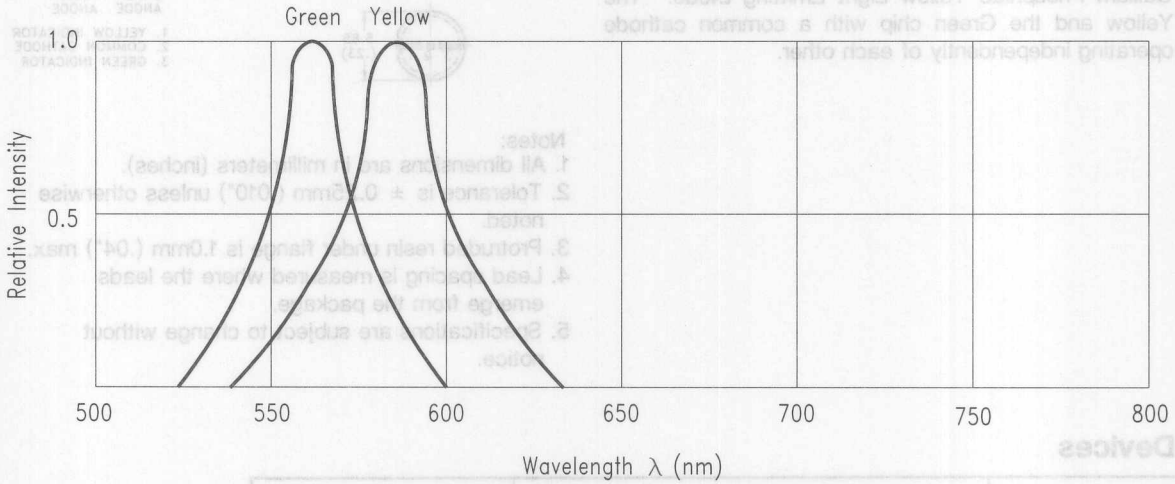


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-30EDJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Green Yellow	8.7 8.7	29 29		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Green Yellow		30		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Green Yellow		565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Green Yellow		569 588		nm	Note 3
Spectral Line Half Width	△ λ	Green Yellow		30 35		nm	
Forward Voltage	VF	Green Yellow		2.1	2.8	V	IF=20mA
Reverse Current	IR	Green Yellow			100	μA	VR=5V
Capacitance	C	Green Yellow		35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

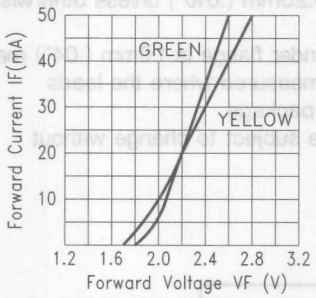


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

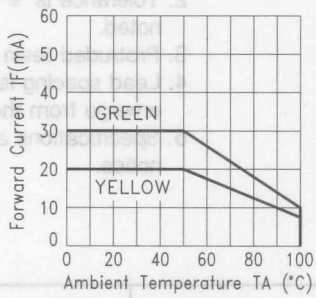


Fig.3 FORWARD CURRENT DERATING CURVE

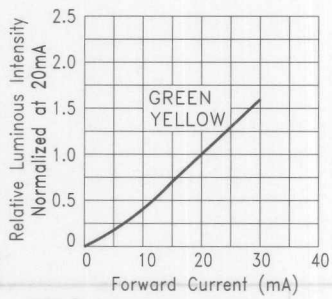


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

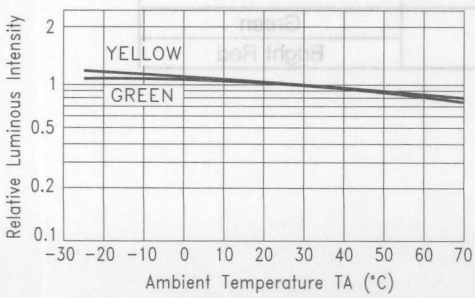


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

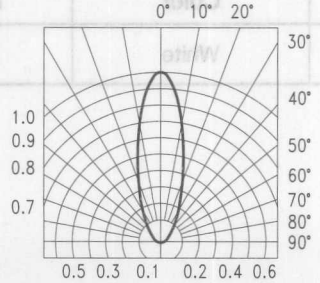


Fig.6 SPATIAL DISTRIBUTION

LED LAMPS

T-1¾(5mm) Dual Color Indicator Lamp

LTL- 30EFJ Bright Red - Green

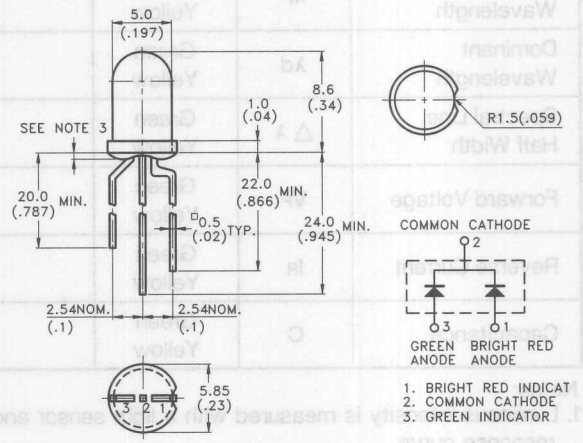
Features

- Red and Green chips are matched for uniform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.

Description

The Bright Red/Green LTL-30EFJ dual color lamp is a white diffused, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode and Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The Bright Red and the Green chip with a common cathode operating independently of each other.

Package Dimensions



Notes

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
30EFJ	White	Diffused	Green
			Bright Red

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation	40	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	mA
Continuous Forward Current	15	30	mA
Derating Linear From 50 ℃	0.2	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

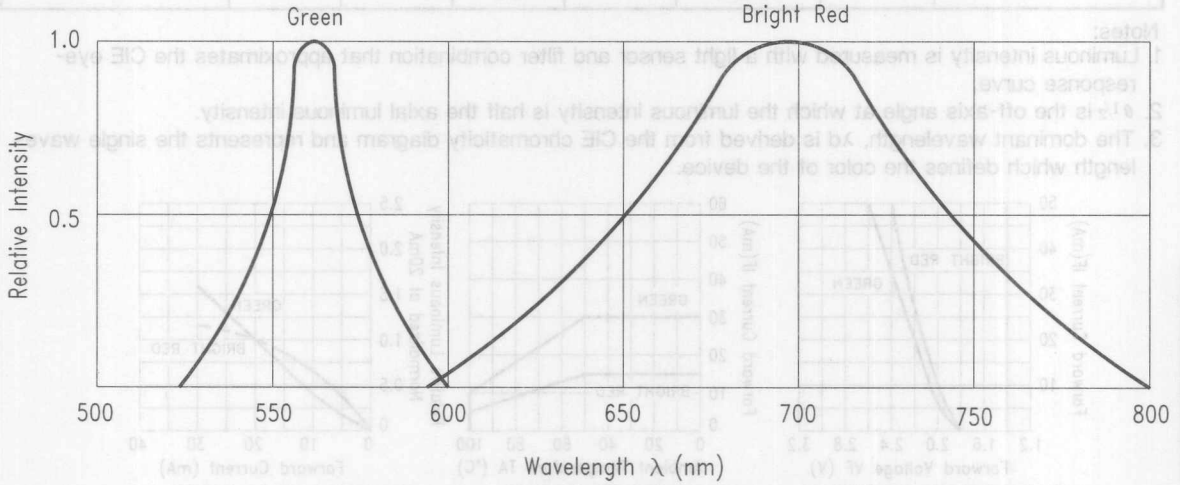


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-30EFJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Bright Red Green	2.5 8.7	8.7 29		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Bright Red Green		30		deg	Note 2 (Fig6)
Peak Emission Wavelength	λP	Bright Red Green		697 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Bright Red Green		657 569		nm	Note 3
Spectral Line Half Width	Δ λ	Bright Red Green		90 30		nm	
Forward Voltage	VF	Bright Red Green		2.1	2.8	V	IF=20mA
Reverse Current	IR	Bright Red Green			100	μA	VR=5V
Capacitance	C	Bright Red Green		55 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

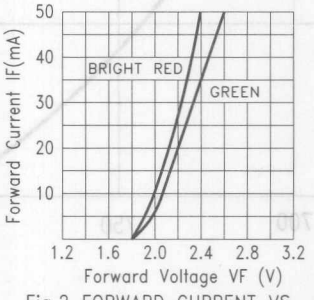


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

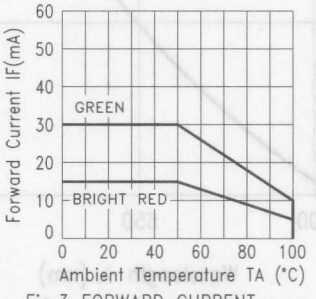


Fig.3 FORWARD CURRENT DERATING CURVE

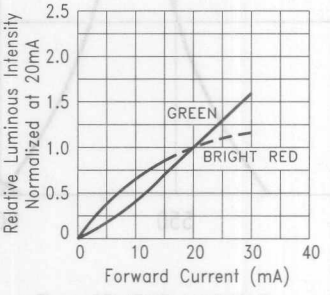


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

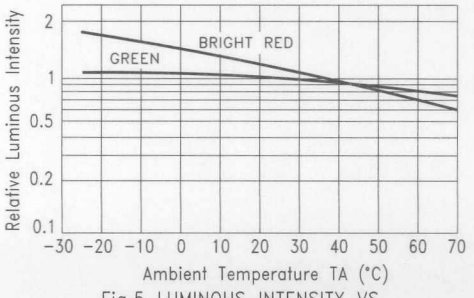


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

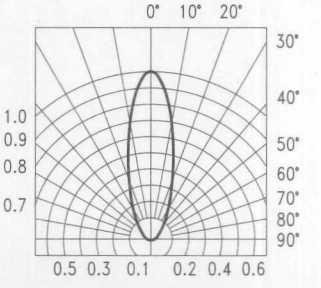


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Dual Color Indicator Lamp

LTL- 30EHJ Orange - Green

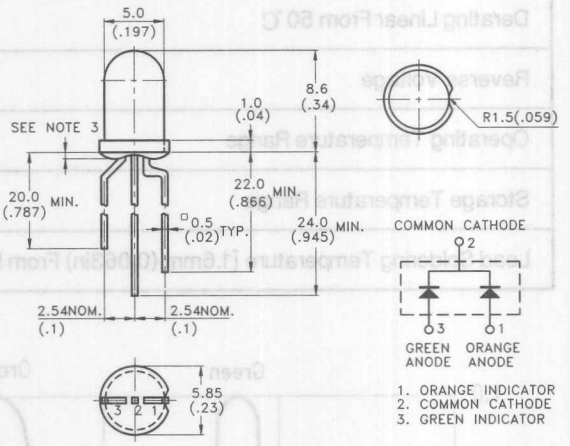
Features

- Orange and Green chips are matched for unform light output.
- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.

Description

The Orange/Green LTL-30EHJ dual color lamp is a white diffused, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode and Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The Orange and the Green chip with a common cathode operating independently of each other .

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
30EHJ	White	Diffused	Green
			Orange

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Unit
Power Dissipation	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	mA
Continuous Forward Current	30	30	mA
Derating Linear From 50 ℃	0.4	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

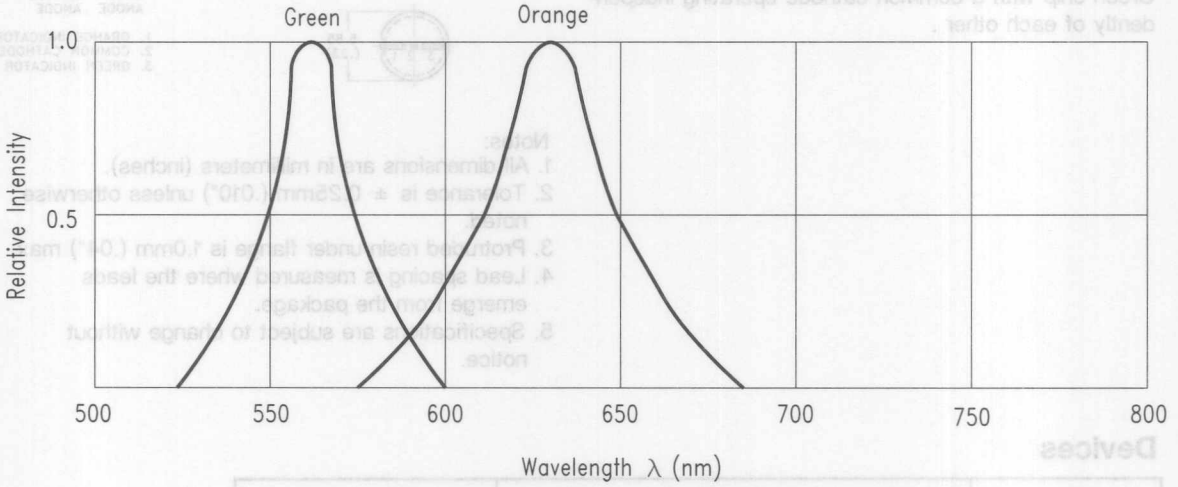


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-30EHJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Orange Green	12.6 8.7	40 29		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Orange Green		30		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Orange Green		630 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Orange Green		621 569		nm	Note 3
Spectral Line Half Width	Δ λ	Orange Green		40 30		nm	
Forward Voltage	VF	Orange Green		2.0 2.1	2.8 2.8	V	IF=20mA
Reverse Current	IR	Orange Green			100	μA	VR=5V
Capacitance	C	Orange Green		20 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

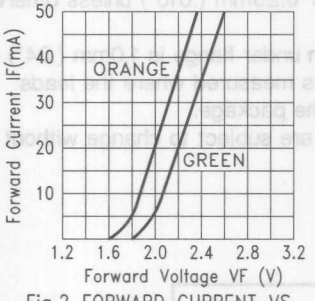


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

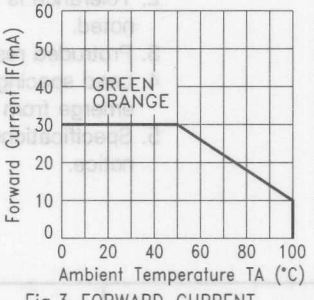


Fig.3 FORWARD CURRENT DERATING CURVE

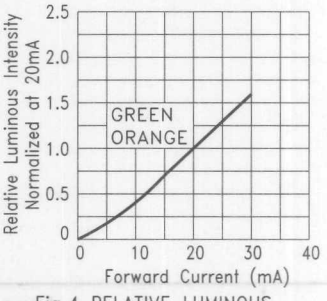


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

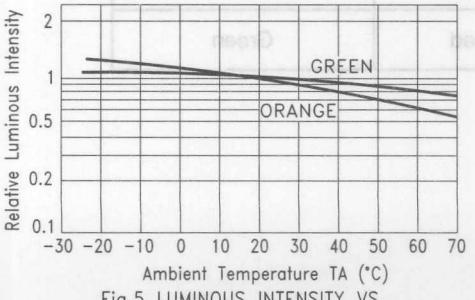


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

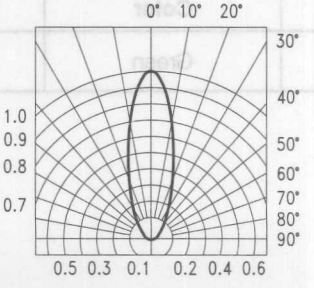


Fig.6 SPATIAL DISTRIBUTION

LITEON

T-1¾(5mm) Bi-Polar Indicator Lamp

LTL- 30EG Dual Green

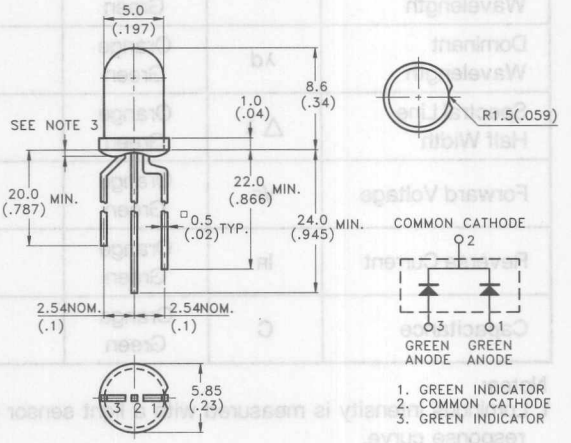
Features

- T-1¾ type package.
- Long life solid state reliability.
- Low power consumption.

Description

The Green LTL-30EG bipolar lamp is a Green diffused, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.
The dual chips operating independently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
30EG	Green	Diffused	Green

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Unit
Power Dissipation	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	mA
Continuous Forward Current	30	mA
Derating Linear From 50 ℃	0.4	mA/ ℃
Reverse Voltage	5	V
Operating Temperature Range	-55 ℃ to +100 ℃	
Storage Temperature Range	-55 ℃ to +100 ℃	
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds	

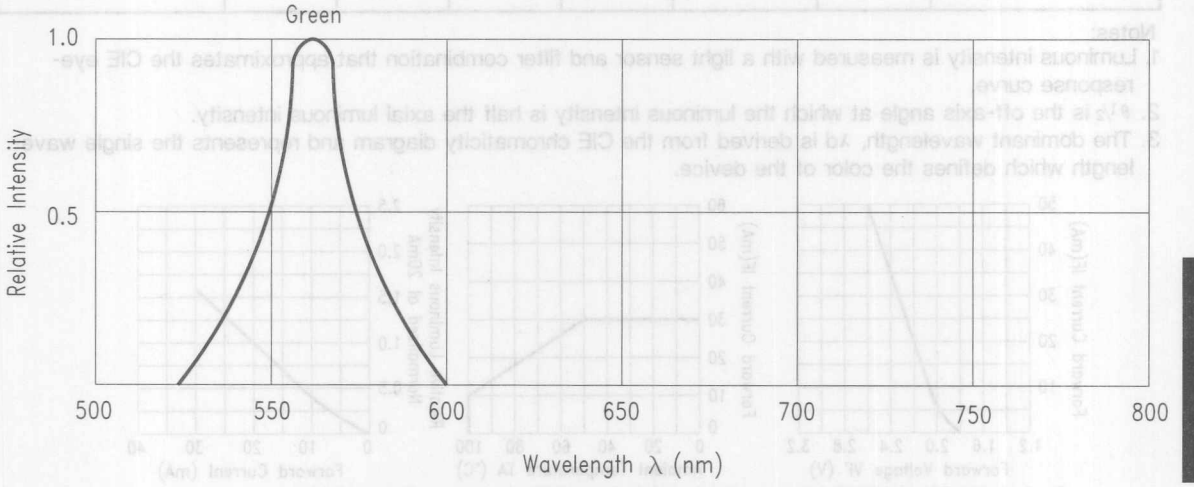


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

LED LAMPS

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. (LTL-)	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	30EG	8.7	29		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	30EG		30		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	30EG		565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	30EG		569		nm	Note 3
Spectral Line Half Width	Δ λ	30EG		30		nm	
Forward Voltage	VF	30EG		2.1	2.8	V	IF=20mA
Reverse Current	IR	30EG			100	μA	VR=5V
Capacitance	C	30EG		35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

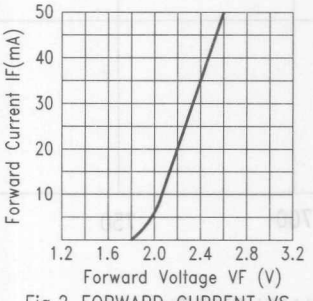


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

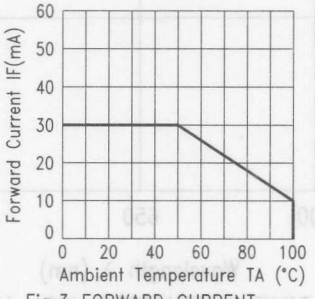


Fig.3 FORWARD CURRENT DERATING CURVE

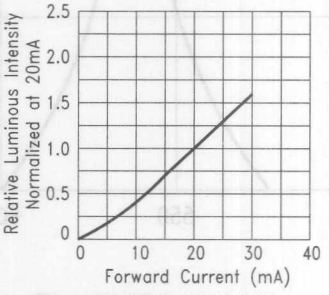


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

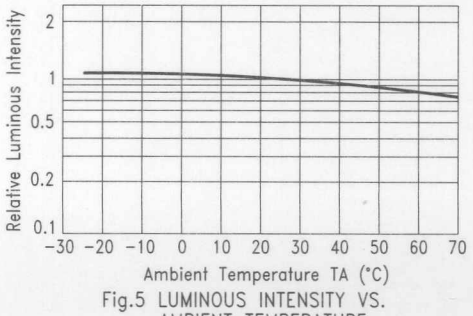


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

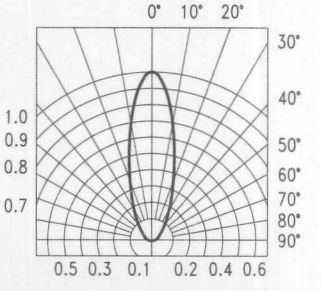


Fig.6 SPATIAL DISTRIBUTION

LITEON

2 × 5(mm) Rectangular Bar Dual Color Indicator Lamp

LTL- 58EHJ Orange - Green

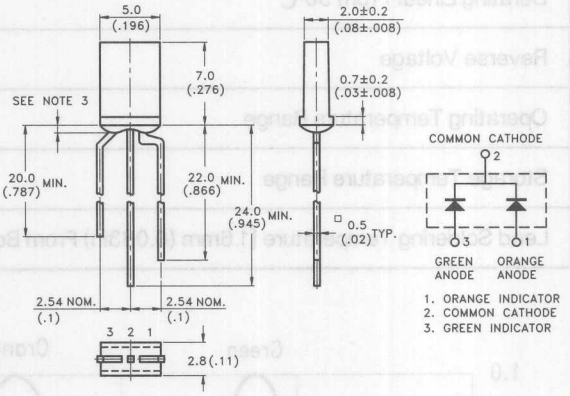
Features

- Orange and Green chips are matched for uniform light output.
- Rectangular type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The LTL-58EHJ dual color lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode. The Orange and the Green chip with a common cathode operating independently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
58EHJ	White	Diffused	Green
			Orange

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Unit
Power Dissipation	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	mA
Continuous Forward Current	30	30	mA
Derating Linear From 50 ℃	0.4	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

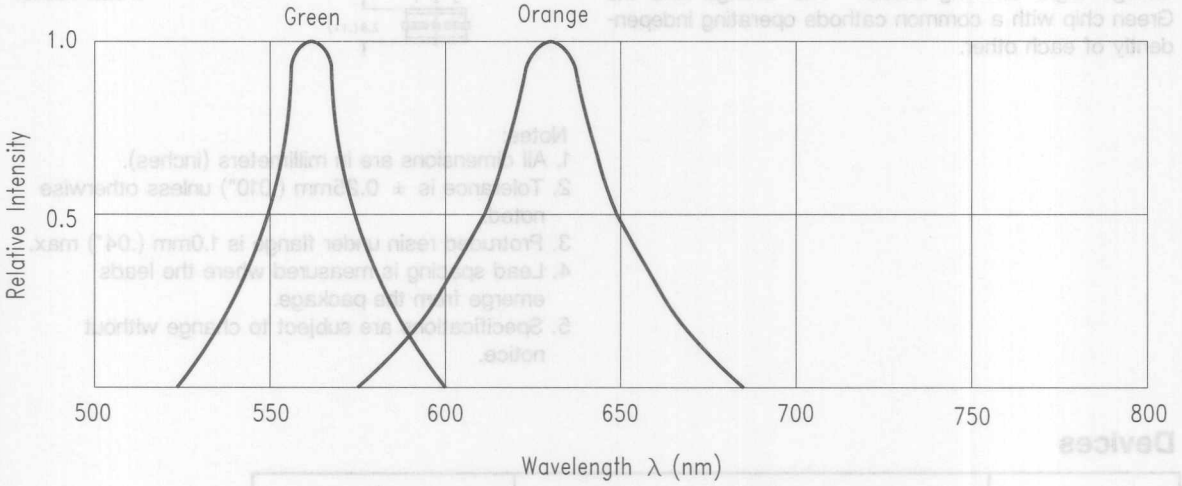


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-58EHJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Orange Green	1.7 2.5	5.6 8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Orange Green		100		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Orange Green		630 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Orange Green		621 569		nm	Note 3
Spectral Line Half Width	△ λ	Orange Green		40 30		nm	
Forward Voltage	VF	Orange Green		2.0 2.1	2.8 2.8	V	IF=20mA
Reverse Current	IR	Orange Green			100	μA	VR=5V
Capacitance	C	Orange Green		20 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

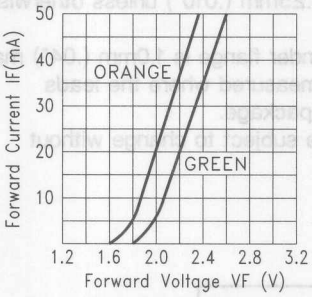


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

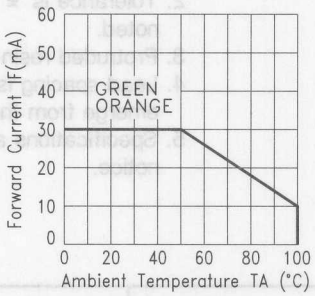


Fig.3 FORWARD CURRENT DERATING CURVE

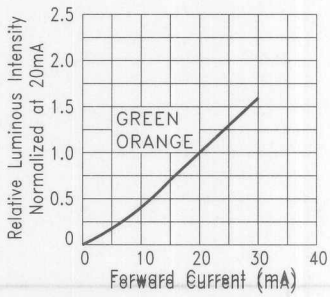


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

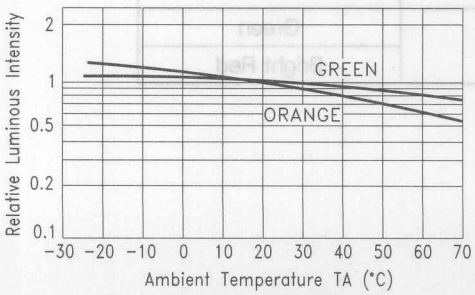


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

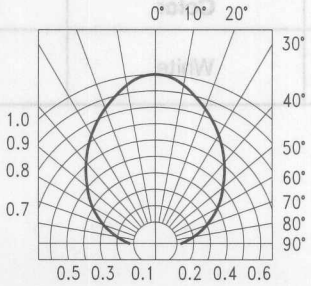


Fig.6 SPATIAL DISTRIBUTION

LED LAMPS

LITEON

2 × 5(mm) Rectangular Bar Dual Color Indicator Lamp

LTL- 58EFJ Bright Red - Green

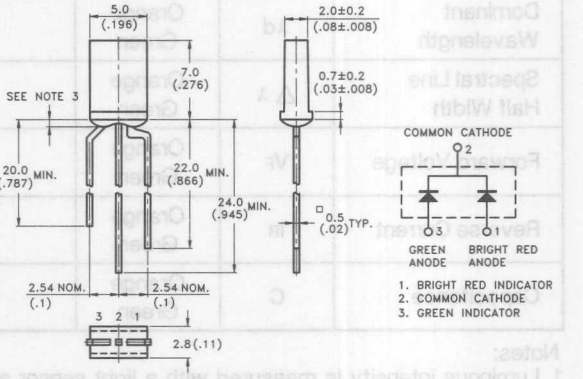
Features

- Red and Green chips are matched for unform light output.
- Rectangular type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Bright Red/Green LTL-58EFJ dual color lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode and Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The Bright Red and the Green chip with a common cathode operating independently of each other.

Package Dimensions



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
58EFJ	White	Diffused	Green
			Bright Red

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation	40	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	mA
Continuous Forward Current	15	30	mA
Derating Linear From 50 ℃	0.2	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

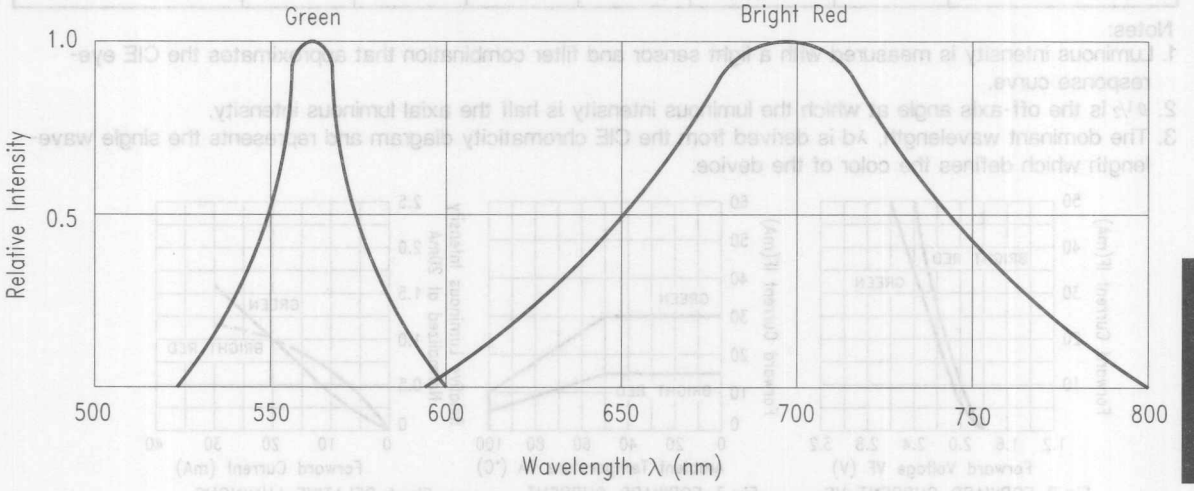


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-58EFJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Bright Red Green	0.4 2.5	1.1 8.7		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Bright Red Green		100		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Bright Red Green		697 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Bright Red Green		657 569		nm	Note 3
Spectral Line Half Width	△ λ	Bright Red Green		90 30		nm	
Forward Voltage	VF	Bright Red Green		2.1	2.8	V	IF=20mA
Reverse Current	IR	Bright Red Green			100	μA	VR=5V
Capacitance	C	Bright Red Green		55 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

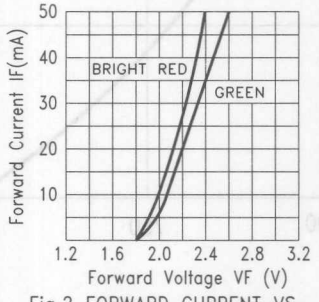


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

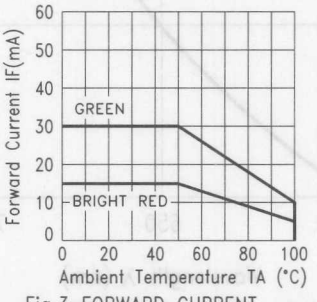


Fig.3 FORWARD CURRENT DERATING CURVE

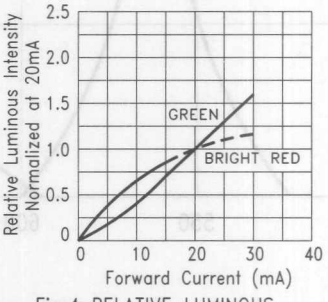


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

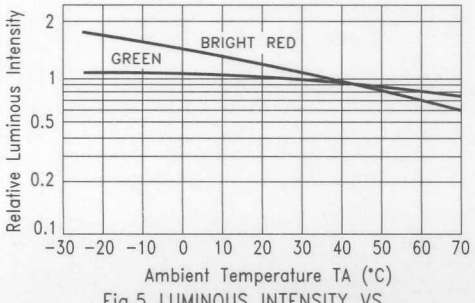


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

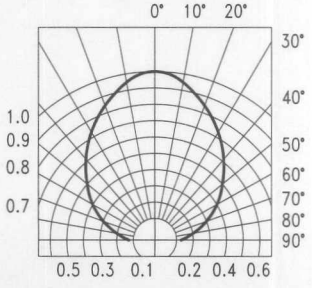


Fig.6 SPATIAL DISTRIBUTION

LITEON

Dual Color Indicator Lamp

LTL- 7AEFJ Bright Red - Green

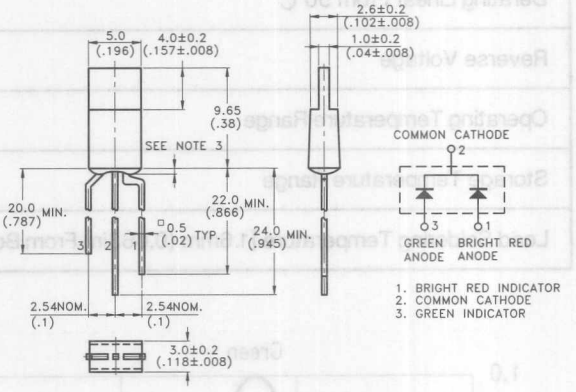
Features

- Red and Green chips are matched for uniform light output.
- Rectangular type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Bright Red/Green LTL-7AEFJ dual color lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode and Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The Bright Red and the Green chip with a common cathode operating independently of each other .

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
7AEFJ	White	Diffused	Green
			Bright Red

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation	40	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	60	120	mA
Continuous Forward Current	15	30	mA
Derating Linear From 50 ℃	0.2	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

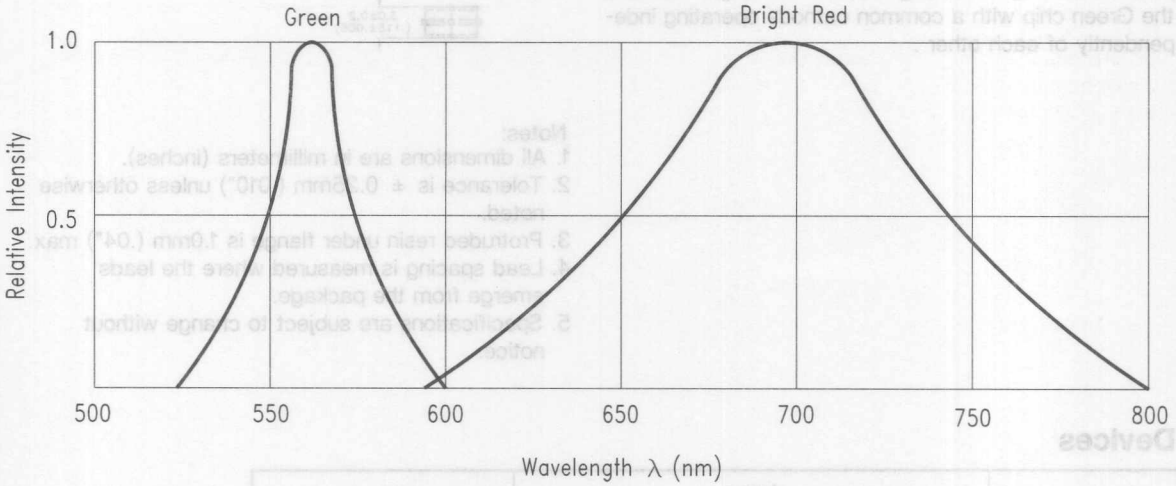


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-7AEFJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Bright Red Green	0.3 1.7	0.8 5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Bright Red Green		120		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Bright Red Green		697 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Bright Red Green		657 569		nm	Note 3
Spectral Line Half Width	△ λ	Bright Red Green		90 30		nm	
Forward Voltage	VF	Bright Red Green		2.1	2.8	V	IF=20mA
Reverse Current	IR	Bright Red Green			100	μA	VR=5V
Capacitance	C	Bright Red Green		55 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

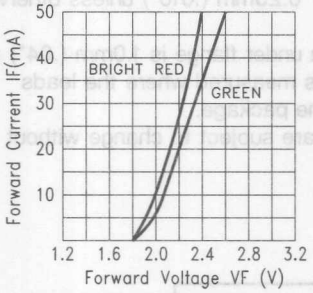


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

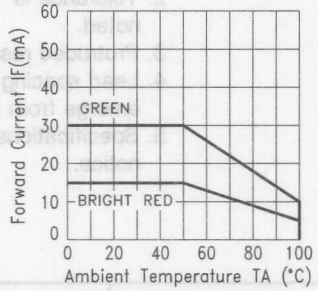


Fig.3 FORWARD CURRENT DERATING CURVE

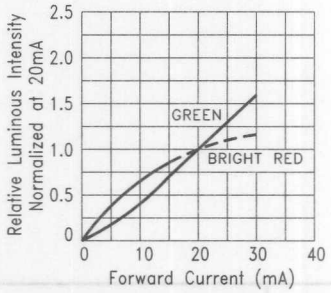


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

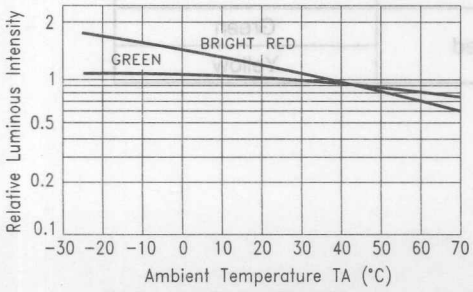


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

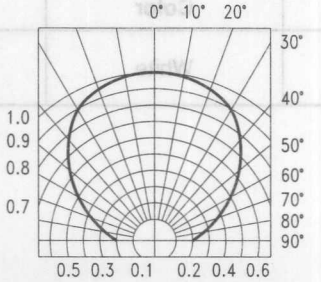


Fig.6 SPATIAL DISTRIBUTION

LITEON

Dual Color Indicator Lamp

LTL- 7AEDJ Yellow - Green

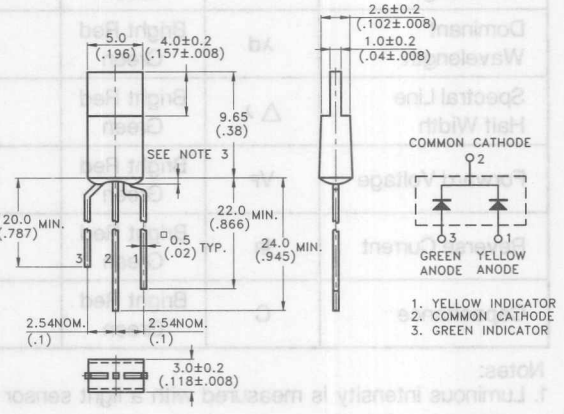
Features

- Yellow and Green chips are matched for uniform light output.
- Rectangular type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Green/Yellow LTL-7AEDJ dual color lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode and Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode. The Yellow and the Green chip with a common cathode operating independently of each other.

Package Dimensions



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
7AEDJ	White	Diffused	Green
			Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Yellow	Green	Unit
Power Dissipation	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	120	mA
Continuous Forward Current	20	30	mA
Derating Linear From 50 ℃	0.25	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

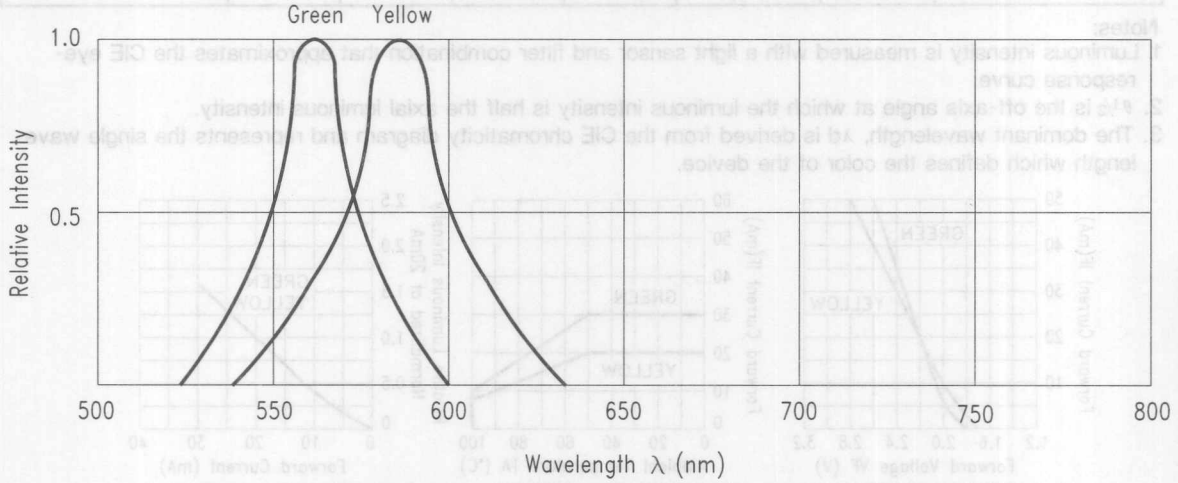


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-7AEDJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Green Yellow	1.7 1.7	5.6 5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ ½	Green Yellow		120		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Green Yellow		565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Green Yellow		569 588		nm	Note 3
Spectral Line Half Width	△λ	Green Yellow		30 35		nm	
Forward Voltage	VF	Green Yellow		2.1	2.8	V	IF=20mA
Reverse Current	IR	Green Yellow			100	μA	VR=5V
Capacitance	C	Green Yellow		35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

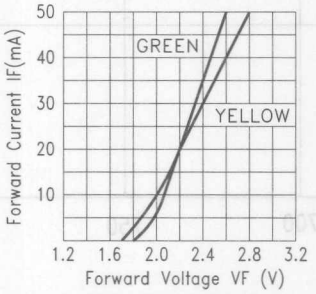


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

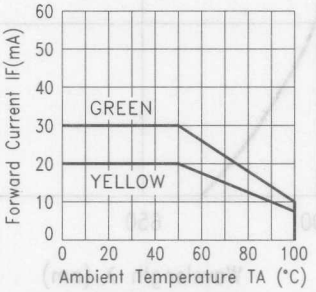


Fig.3 FORWARD CURRENT DERATING CURVE

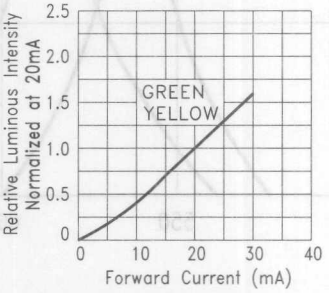


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

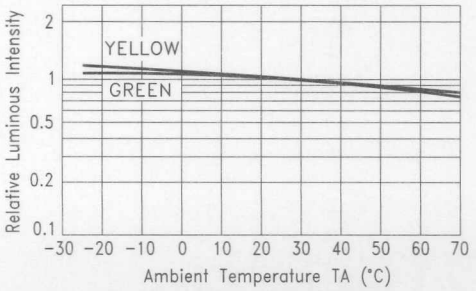


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

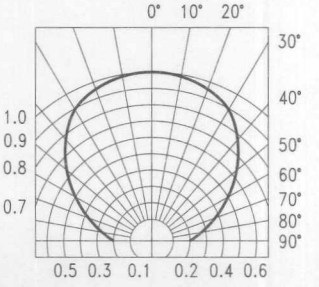


Fig.6 SPATIAL DISTRIBUTION

LITEON

Dual Color Indicator Lamp

LTL- 7BEHJ Orange - Green

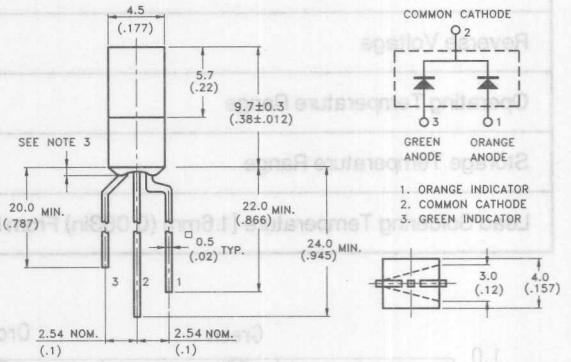
Features

- Orange and Green chips are matched for uniform light output.
- Rectangular type package.
- Long life solid state reliability.
- Low power consumption.
- I.C. compatible.

Description

The Orange/Green LTL-7BEHJ dual color lamp is a white diffused, wide viewing angle, dual chips, utilizing Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode and Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode. The Orange and the Green chip with a common cathode operating independently of each other.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
7BEHJ	White	Diffused	Green
			Orange

LED LAMPS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Unit
Power Dissipation	100	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	mA
Continuous Forward Current	30	30	mA
Derating Linear From 50 ℃	0.4	0.4	mA/ ℃
Reverse Voltage	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃		
Storage Temperature Range	-55 ℃ to +100 ℃		
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds		

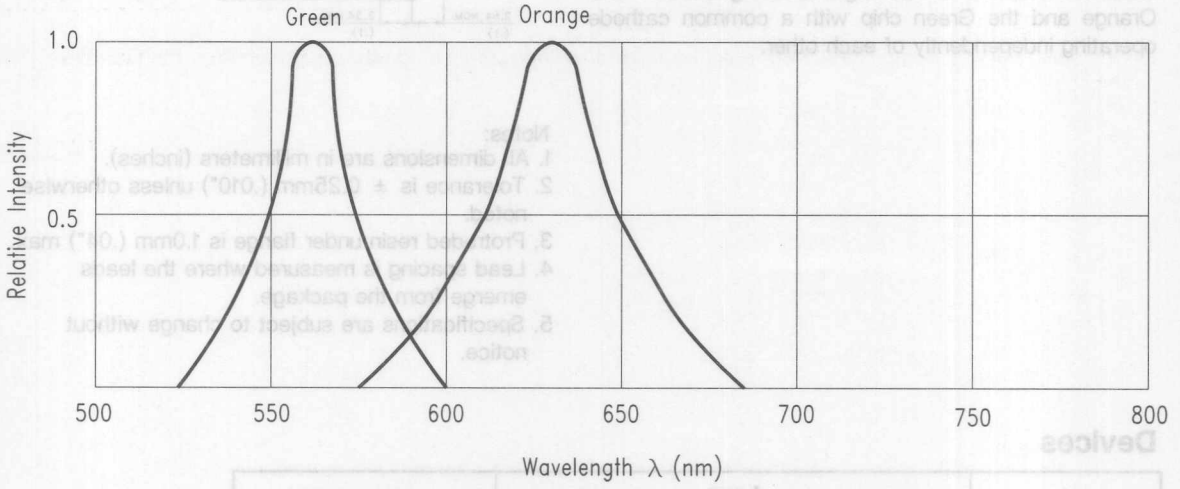


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25 ℃

Parameter	Symbol	Part No. LTL-7BEHJ	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	Orange Green	1.7 1.7	5.6 5.6		mcd	IF=20 mA Note 1
Viewing Angle	2 θ 1/2	Orange Green		100		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	Orange Green		630 565		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	Orange Green		621 569		nm	Note 3
Spectral Line Half Width	△λ	Orange Green		40 30		nm	
Forward Voltage	VF	Orange Green		2.0 2.1	2.8 2.8	V	IF=20mA
Reverse Current	IR	Orange Green			100	μA	VR=5V
Capacitance	C	Orange Green		20 35		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

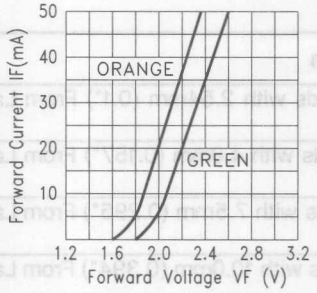


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

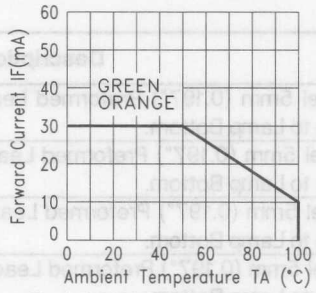


Fig.3 FORWARD CURRENT DERATING CURVE

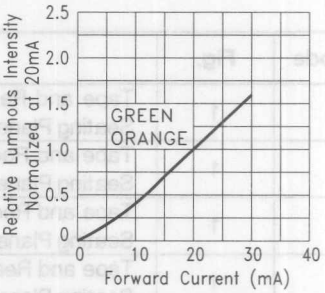


Fig.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

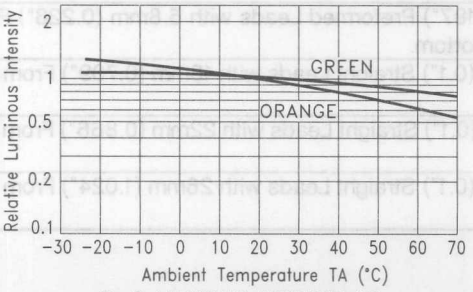


Fig.5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

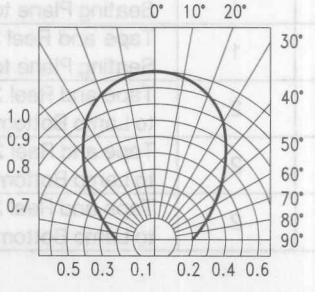


Fig.6 SPATIAL DISTRIBUTION

LITEON

Lamps are Available in Tape and Reel

Features

- Compatible with radial lead automatic insertion equipment.
- Most radial lead plastic LED Lamps available packaged in Tape and Reel.
- Reel packaging simplifies handling and testing.
- 5mm (0.197") formed lead and 2.54mm (0.1") straight lead spacing available.

Description

The option 001 Lamp devices have preformed leads with 5mm (0.197 inch) spacing for automatic insertion into P.C. boards by radial lead insertion equipment. The option 002 Lamp devices have straight leads with 2.54mm (0.1 inch) spacing. Packaged taped and reeled for ease of handling. Most standard catalog radial lead LED Lamps are available packaged in the Tape and Reel.

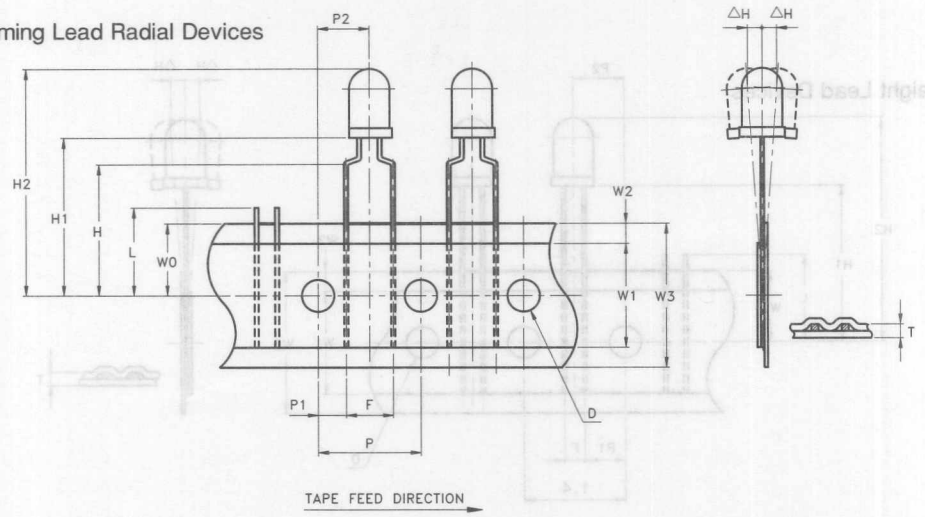
Ordering Informations

To order LED Lamps packaged on Tape and Reel, include the appropriate option code along with the device catalog part number, Example: To order the LTL-4200 Series on Tape and Reel with preformed leads (5mm lead spacing) order as follows:LTL-4200-001 or LTL-4200-011.
LED Lamps with 0.4mm square leads with 5mm lead spacing are recommented for use with automatic insertion equipment. It is suggested that insertion machine compatibility be confirmed.

Devices

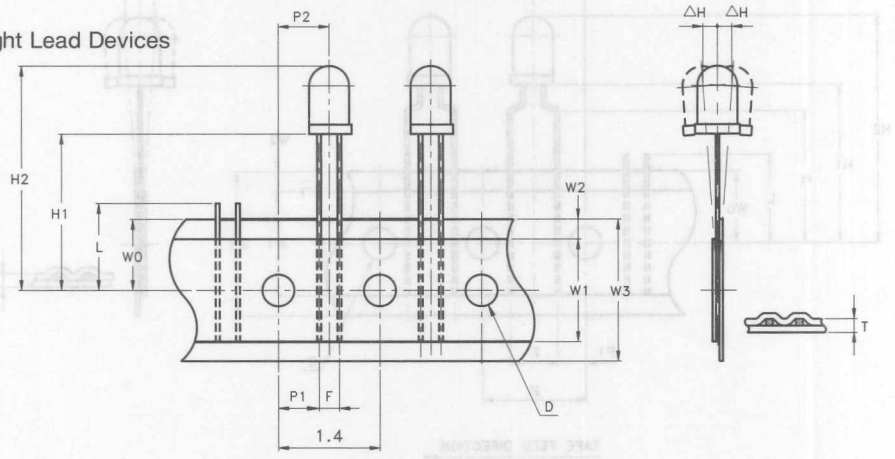
Option Code	Fig.	Description
-001	1	Tape and Reel 5mm (0.197") Preformed Leads with 2.54mm (0.1") From Lamp Seating Plane to Lamp Bottom.
-011	1	Tape and Reel 5mm (0.197") Preformed Leads with 4.0mm (0.157") From Lamp Seating Plane to Lamp Bottom.
-021	1	Tape and Reel 5mm (0.197") Preformed Leads with 7.5mm (0.295") From Lamp Seating Plane to Lamp Bottom.
-031	1	Tape and Reel 5mm (0.197") Preformed Leads with 10.0mm (0.394") From Lamp Seating Plane to Lamp Bottom.
-041	1	Tape and Reel 5mm (0.197") Preformed Leads with 6.5mm (0.256") From Lamp Seating Plane to Lamp Bottom.
-051	1	Tape and Reel 5mm (0.197") Preformed Leads with 5.8mm (0.228") From Lamp Seating Plane to Lamp Bottom.
-002	2	Tape and Reel 2.54mm (0.1") Straight Leads with 18mm (0.709") From Feed Hole to Lamp Bottom.
-012	2	Tape and Reel 2.54mm (0.1") Straight Leads with 22mm (0.866") From Feed Hole to Lamp Bottom.
-022	2	Tape and Reel 2.54mm (0.1") Straight Leads with 26mm (1.024") From Feed Hole to Lamp Bottom.

FIG. 1: Forming Lead Radial Devices



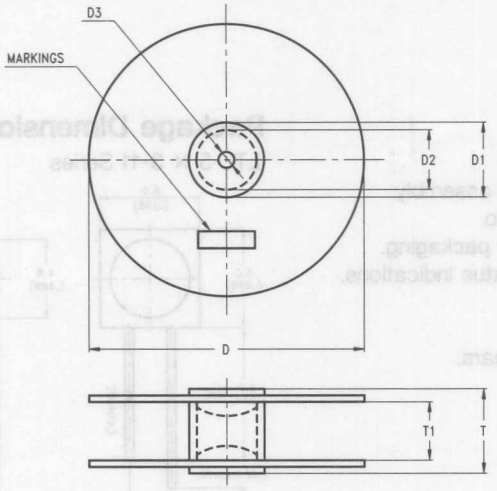
Item	Option Code	Symbol	Specification			
			Minimum		Maximum	
			MM	INCH	MM	INCH
Tape Feed Hole Diameter	-	D	3.8	0.149	4.2	0.165
Component Lead Pitch	-	F	4.8	0.188	5.8	0.228
Front to Rear Deflection	-	Δ H	-	-	2.0	0.078
Height of Seating Plane	-	H	15.5	0.610	16.5	0.649
Feed Hole to Bottom of Component	-001	H1	17.5	0.689	19.5	0.767
	-011		19.0	0.748	21.0	0.826
	-021		22.5	0.886	24.5	0.965
	-031		25.0	0.984	27.0	1.063
	-041		21.5	0.846.	23.5	0.925
	-051		21.1	0.831	22.5	0.886
Feed Hole to Overall Component Height	-	H2	-	-	32.0	1.259
Lead Length After Component Height	-	L	W_O		11.0	0.433
Feed Hole Pitch	-	P	12.4	0.488	13.0	0.511
Lead Location	-	P1	3.15	0.124	4.55	0.179
Center of Component Location	-	P2	5.05	0.198	7.65	0.301
Total Tape Thickness	-	T	-	-	0.90	0.035
Feed Hole Location	-	W_O	8.5	0.334	9.75	0.384
Adhesive Tape Width	-	W_1	12.5	0.492	13.5	0.531
Adhesive Tape Position	-	W_2	0	0	3.0	0.118
Tape Width	-	W_3	17.5	0.689	19.0	0.748

Fig. 2: Straight Lead Devices



Item	Option Code	Symbol	Specification			
			Minimum		Maximum	
			MM	INCH	MM	INCH
Tape Feed Hole Diameter	-	D	3.8	0.149	4.2	0.165
Component Lead Pitch			2.3	0.091	3.0	0.118
Front to Rear Deflection	-	Δ H	-	-	2.0	0.078
Feed Hole to Bottom of Component	-002	H1	17.5	0.689	18.5	0.728
	-012		21.5	0.846	22.5	0.886
	-022		25.5	1.004	26.5	1.043
Feed Hole to Overall Component Height	-	H2	-	-	32.0	1.259
Lead Length After Component Height	-	L	W_O		11.0	0.433
Feed Hole Pitch	-	P	12.4	0.488	13.0	0.511
Lead Location	-	P1	4.4	0.173	5.8	0.228
Center of Component Location	-	P2	5.05	0.198	7.65	0.301
Total Tape Thickness	-	T	-	-	0.90	0.035
Feed Hole Location	-	W_O	8.5	0.334	9.75	0.384
Adhesive Tape Width	-	W_1	12.5	0.492	13.5	0.531
Adhesive Tape Position	-	W_2	0	0	3.0	0.118
Tape Width	-	W_3	17.5	0.689	19.0	0.748

Fig. 3: Device Packaging



Item	Symbol	Specification				Remarks
		Minimum		Maximum		
		MM	INCH	MM	INCH	
Reel Diameter	D	78.2	3.07	380.0	14.96	
Core Diameter	D1	34.9	1.37	102.0	4.02	
Hub Recess Inside Diameter	D2	28.6	1.12	88.0	3.47	
Arbor Hole Diameter	D3	13.8	0.54	38.1	1.5	
Overall Reel Thickness	T	-	-	57.2	2.25	
Inside Reel Flange Thickness	T1	30.0	1.18	50.0	1.97	

LITEON

One and Four Element LED Arrays

LTL-5x3-14 Series
LTL-5x3-11 Series

Features

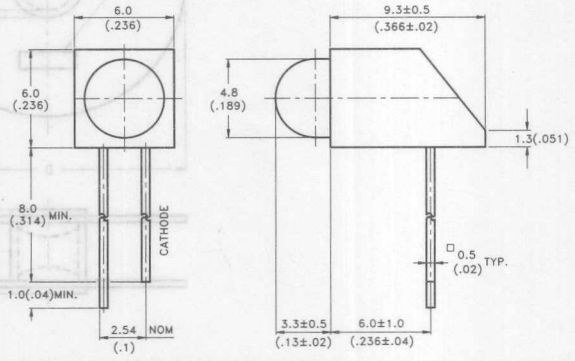
- Designed for ease in circuit board assembly.
- Black case enhances contrast ratio.
- Designed to allow for high density packaging.
- Single package provides 4-line status indications.
- Solid state light source.
- Wide viewing angle.
- High reliability Life measured in years.

Applications

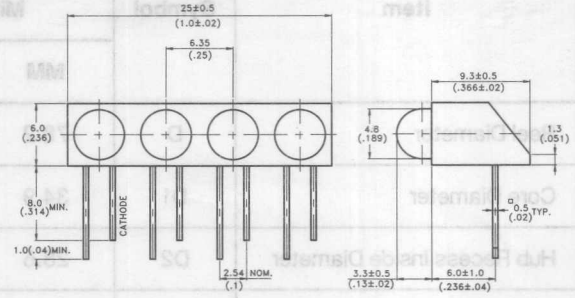
- Circuit board indicator.
- Panel illumination.
- Logic status indicator.
- Binary data display Permits stacking so that multiple functions can be displayed.
- Position indicator.

Package Dimensions

LTL-5 × 3-11 Series



LTL-5 × 3-14 Series



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.
3. The holder color is black only.

Devices

Part No. LTL-	Lens		Source Color
	Color	Diffusion	
503-11 503-14	Red	Diffused	Red
533-11 533-14	Green	Diffused	Green
553-11 553-14	Yellow	Diffused	Yellow

Absolute Maximum Ratings at Ta=25 ℃

Parameter	LTL-503-11 503-14	LTL-533-11 533-14	LTL-553-11 553-14	Unit
Power Dissipation	80	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	120	80	mA
Continuous Forward Current	40	30	20	mA
Derating Linear From 50 ℃	0.5	0.4	0.25	mA/ ℃
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 ℃ to +100 ℃			
Storage Temperature Range	-55 ℃ to +100 ℃			
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 ℃ for 5 Seconds			

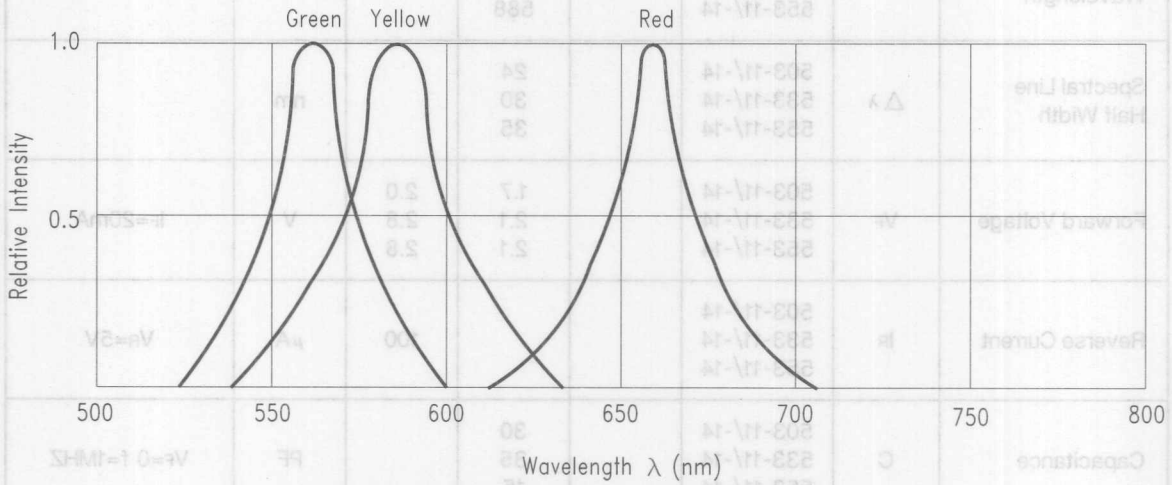


Fig.1 RELATIVE INTENSITY VS. WAVELENGTH

Electrical / Optical Characteristics and Curves at Ta = 25℃

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	Iv	503-11/-14 533-11/-14 553-11/-14	0.4 12.6 3.7	1.1 40 12.6		mcd	IF=10 mA Note 1
Viewing Angle	2 θ 1/2	503-11/-14 533-11/-14 553-11/-14		60		deg	Note 2 (Fig.6)
Peak Emission Wavelength	λP	503-11/-14 533-11/-14 553-11/-14		655 565 585		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λd	503-11/-14 533-11/-14 553-11/-14		651 569 588		nm	Note 3
Spectral Line Half Width	△λ	503-11/-14 533-11/-14 553-11/-14		24 30 35		nm	
Forward Voltage	VF	503-11/-14 533-11/-14 553-11/-14		1.7 2.1 2.1	2.0 2.8 2.8	V	IF=20mA
Reverse Current	IR	503-11/-14 533-11/-14 553-11/-14			100	μA	VR=5V
Capacitance	C	503-11/-14 533-11/-14 553-11/-14		30 35 15		PF	VF=0 f=1MHZ

Notes:
1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

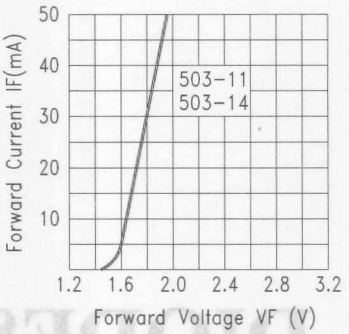


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

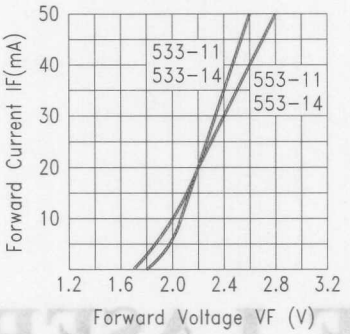


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

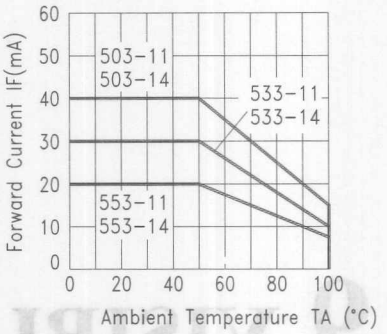


Fig.4 FORWARD CURRENT DERATING CURVE

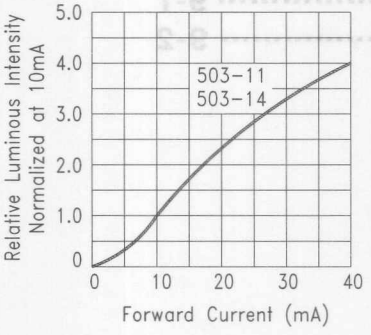


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

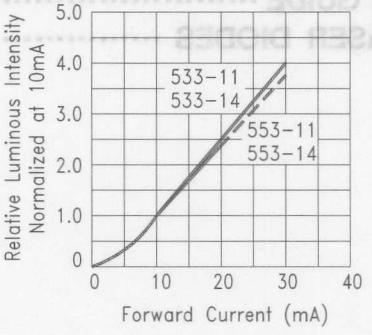


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

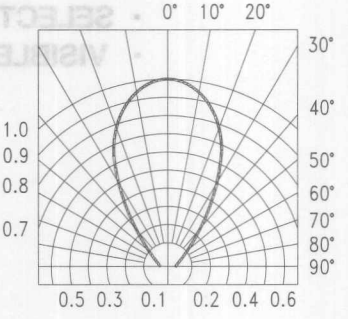


Fig.7 SPATIAL DISTRIBUTION

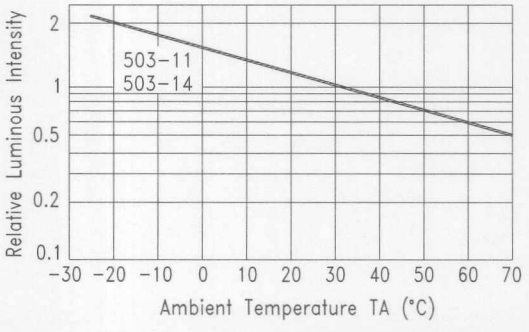


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

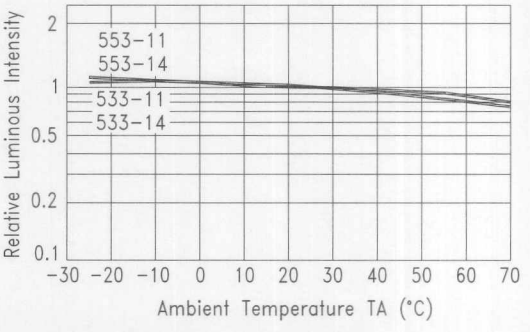
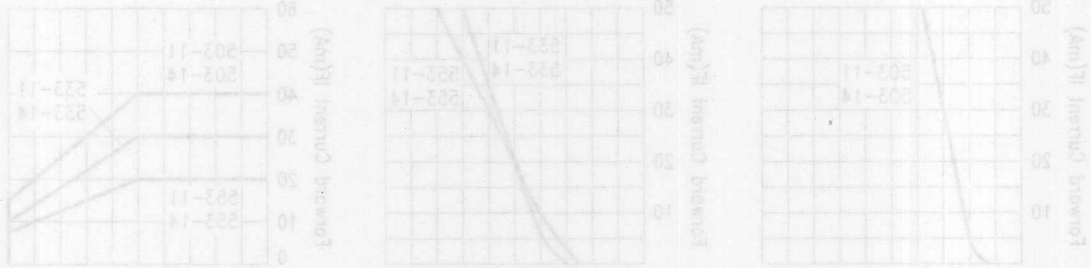


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE



9. VISIBLE LASER DIODES

- SELECTION GUIDE 9-1
- VISIBLE LASER DIODES 9-2

Selection Guide

· Visible Laser Diodes

Part No.	Feature	Absolute Maximum Rating		Electro-optical Characteristic(Tc=25 ℃)							Package	Page No.
		Optical Output Power	Operation Case Temperature	Optical Output Power	Threshold Current	Operation Current	Lasing Wavelength	Monitor Current	Beam Divergence			
		Po	Tc	Po	I_{th}	I_{op}	λ_p	I_m	$\theta_{//}$	$\theta_{\perp}$		
		mW	℃	mW	mA	mA	nm	mA	deg	deg		
LTLD 505T	50℃ at 5mW	6	-10℃ ~ +50℃	5	35	45	650	0.55	8	35	TO-18	9-2
LTLD 605T	50℃ at 5mW	6	-10℃ ~ +50℃	5	25	35	660	0.1	8	30	TO-18	9-6

PRELIMINARY

LITEON

Visible Laser Diodes

LTLD505T

Features

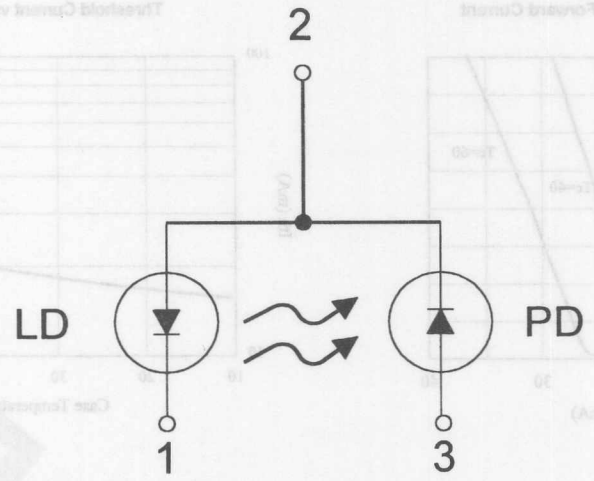
Liton's LTLD505T low-cost AlGaInP laser diode emits highly visible 650 nm output light with low threshold current and high output efficiency. A diffraction-limited single spatial mode beam output allows easy collimation with readily available optics. The active layer is MOCVD grown strained quantum well epitaxial structure. The high output efficiency is achieved by optimized device structure desingn. Both laser facets are coated with multilayer dielectric to assure high performance and reliability. APIN photo-diode is included with each laser for output power monitoring. Lition's LTLD505T is ideal for pointing, alignment,and bar code scanning applications.

Elcctro-optical Characteristic(Tc=25 ℃)

ITEMS	SYMBOL	TEST CONDITION	MIN	TYP.	MAX.	UNIT
Optical Output Power	Po	Kink Free	5	-	-	mW
Threshold Current	I_{th}		-	35	60	mA
Operation Current	I_{op}	Po=5 mW	-	45	70	mA
Operation Voltage	V_{op}	Po=5 mW	-	2.4	2.6	V
Lasing Wavelength	λ_{op}	Po=5 mW	645	650	655	nm
Slope Efficiency	η	3mW ~ 5mW	0.1	0.4	-	mW/mA
Beam Divergence	$\theta_{\perp}$	Po=5 mW,FWHM	-	35	-	deg.
	$\theta_{//}$	Po=5 mW,FWHM	-	8	-	deg.
Monitor Current	I_m	Po=5 mW	0.1	0.55	0.85	mA

PRELIMINARY

Pin Connection:



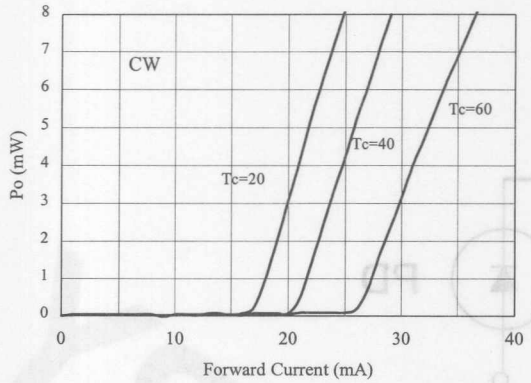
1. Laser diode cathode
2. Laser diode anode and photodiode cathode
3. Photodiode anode

Absolute Maximum Ratings(Tc=25 ℃)

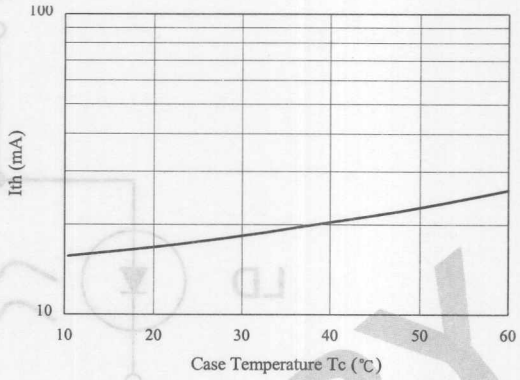
ITEMS	SYMBOL	RATINGS	UNIT
Optical Output Power	Po	6	mW
LD Reverse Voltage	$V_{R(LD)}$	2	V
PD Reverse Voltage	$V_{R(PD)}$	30	V
Operation Case Temperature	Tc	-10 ~ +50	℃

PRELIMINARY

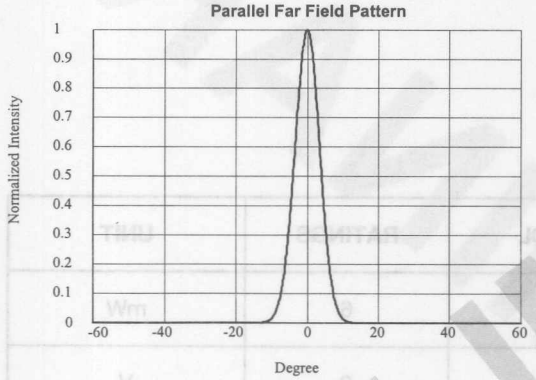
Optical Output Power (Po) vs. Forward Current



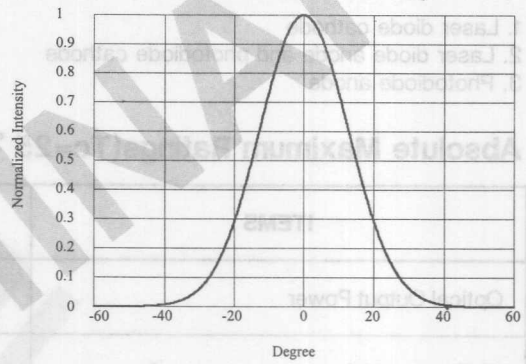
Threshold Current vs. Temperature



Parallel Far Field Pattern



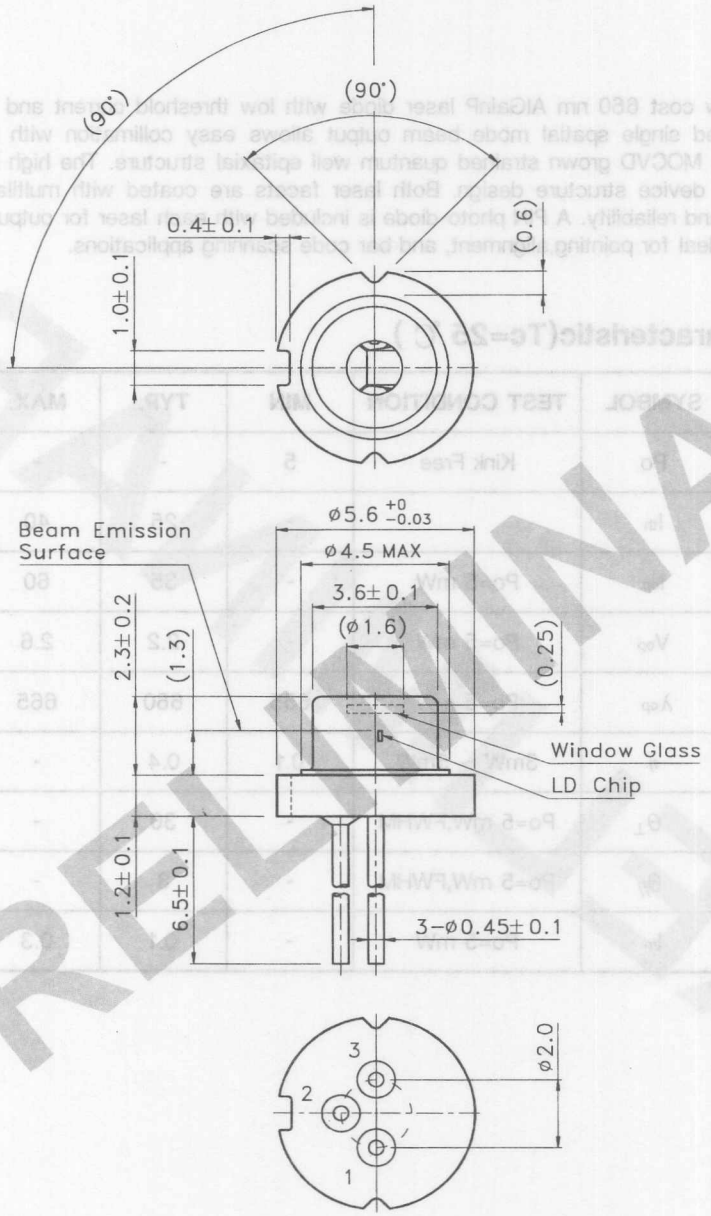
Perpendicular Far Field Pattern



PRELIMINARY

Package Outline:

Units in: mm



PRELIMINARY

LITEON

Visible Laser Diodes

LTLD605T

Features:

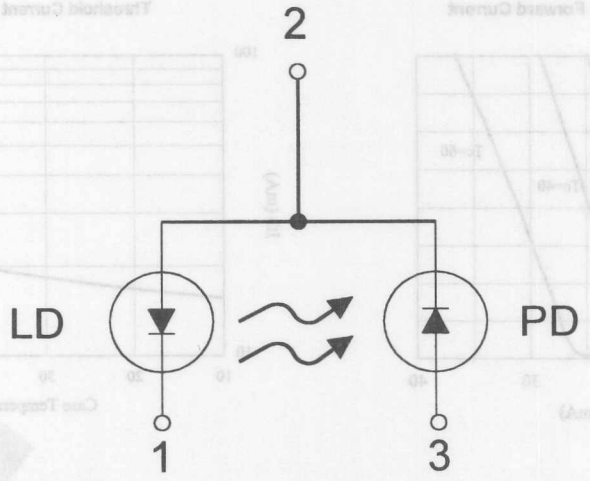
Liton's LTLD605T is a low cost 660 nm AlGaInP laser diode with low threshold current and high output efficiency. A diffraction-limited single spatial mode beam output allows easy collimation with readily available optics. The astive layer is MOCVD grown strained quantum well epitaxial structure. The high output efficiency is achieved by optimized device structure design. Both laser facets are coated with multilayer dielectric to assure high performance and reliability. A PIN photo-diode is included with each laser for output power monitoring, Liton's LTLD605T is ideal for pointing,alignment, and bar code scanning applications.

Elcctro-optical Characteristic(Tc=25 ℃)

ITEMS	SYMBOL	TEST CONDITION	MIN	TYP.	MAX.	UNIT
Optical Output Power	Po	Kink Free	5	-	-	mW
Threshold Current	I_{th}		-	25	40	mA
Operation Current	I_{op}	Po=5 mW	-	35	60	mA
Operation Voltage	V_{op}	Po=5 mW	-	2.2	2.6	V
Lasing Wavelength	λ_{op}	Po=5 mW	655	660	665	nm
Slope Efficiency	η	3mW ~ 5mW	0.1	0.4	-	mW/mA
Beam Divergence	$\theta_{\perp}$	Po=5 mW,FWHM	-	30	-	deg.
	$\theta_{//}$	Po=5 mW,FWHM	-	8	-	deg.
Monitor Current	I_m	Po=5 mW	-	0.1	0.3	mA

PRELIMINARY

Pin Connection:



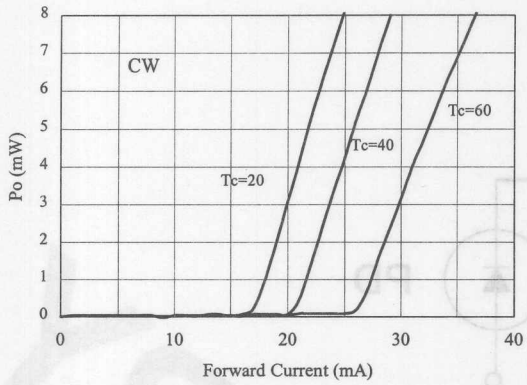
1. Laser diode cathode
2. Laser diode anode and photodiode cathode
3. Pphotodiode anode

Absolute Maximum Ratings(Tc=25 ℃)

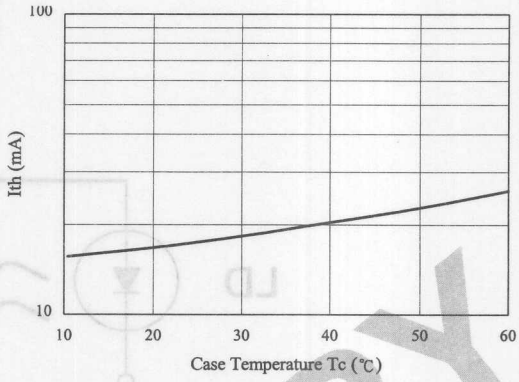
ITEMS	SYMBOL	RATINGS	UNIT
Optical Output Power	Po	6	mW
LD Reverse Voltage	$V_{R(LD)}$	2	V
PD Reverse Voltage	$V_{R(PD)}$	30	V
Operation Case Temperature	Tc	-10 ~ +50	℃

PRELIMINARY

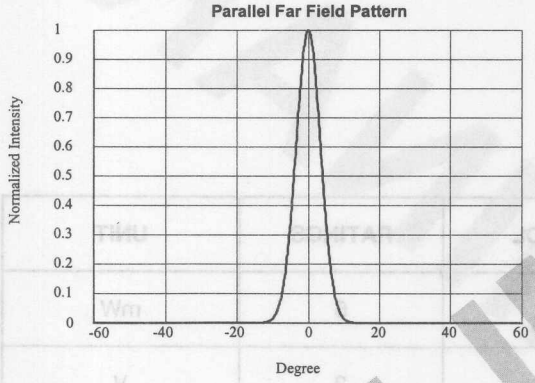
Optical Output Power (Po) vs. Forward Current



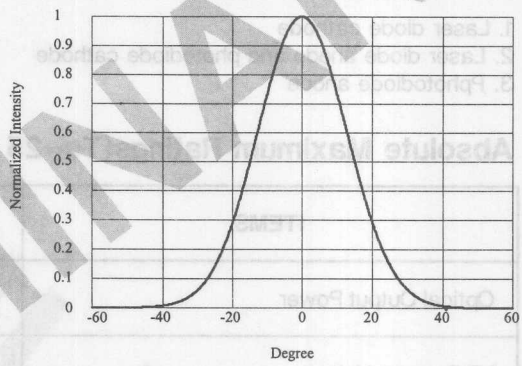
Threshold Current vs. Temperature



Parallel Far Field Pattern



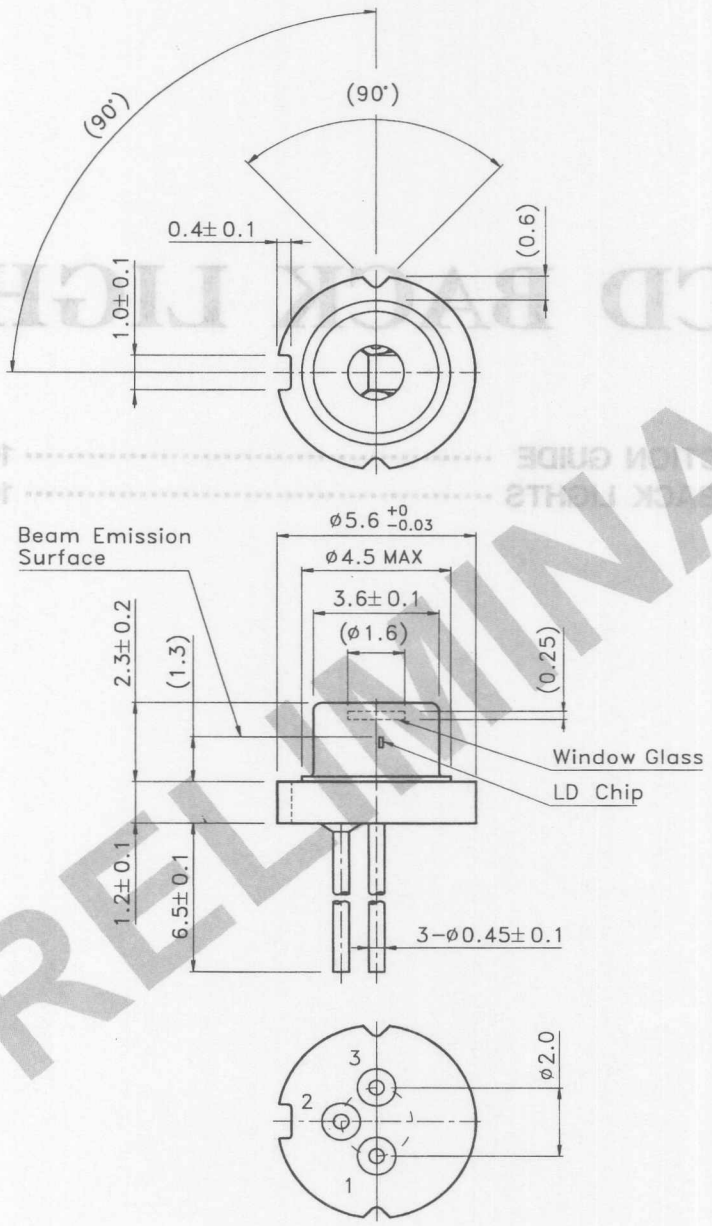
Perpendicular Far Field Pattern



PRELIMINARY

Package Outline:

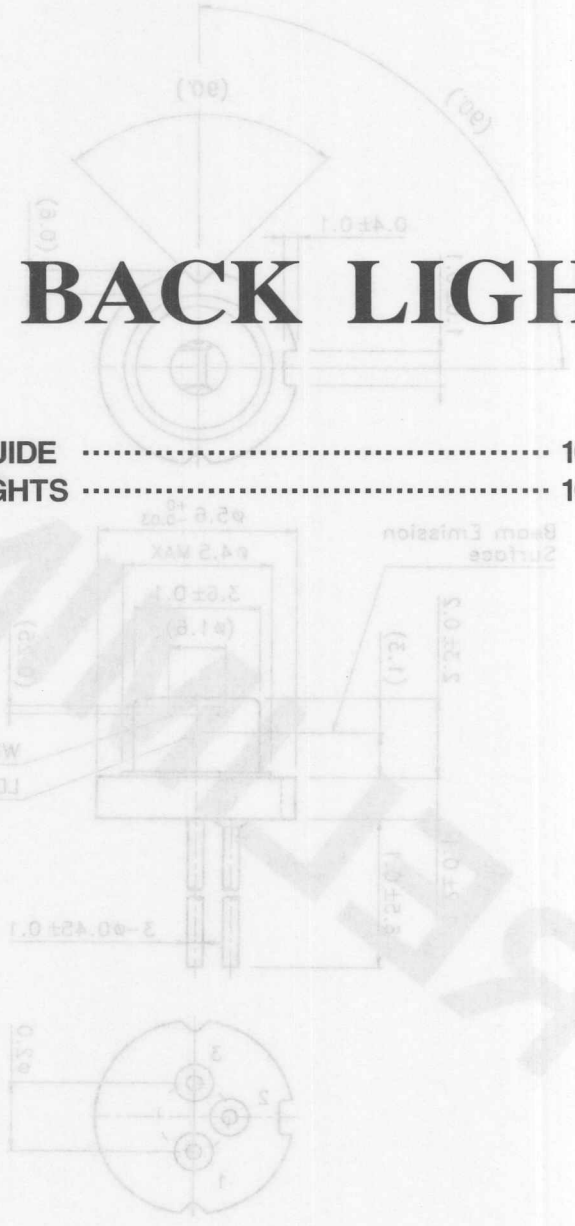
Units in: mm



PRELIMINARY

10.LCD BACK LIGHTS

- SELECTION GUIDE 10-1
- LCD BACK LIGHTS 10-2



Selection Guide

· LCD Back Light

Outline	Device			Description		Illuminance Intensity Typ. cd/m²	Page No.
	Part No. LBL-	Dimension (mm)	View Area (mm)	Color	Input Current		
	9316G	73.7x18.6x6	6.72x16.4	Yellow Green (570 nm)	90mA	115	10-2
	9667G	43.8x33x2.5	38x22	Yellow Green (570 nm)	40mA	9	10-5
	9752G	54x70x3	50x62	Yellow Green (570 nm)	80mA	20	10-8

LITEON Back Light

LBL-9316G

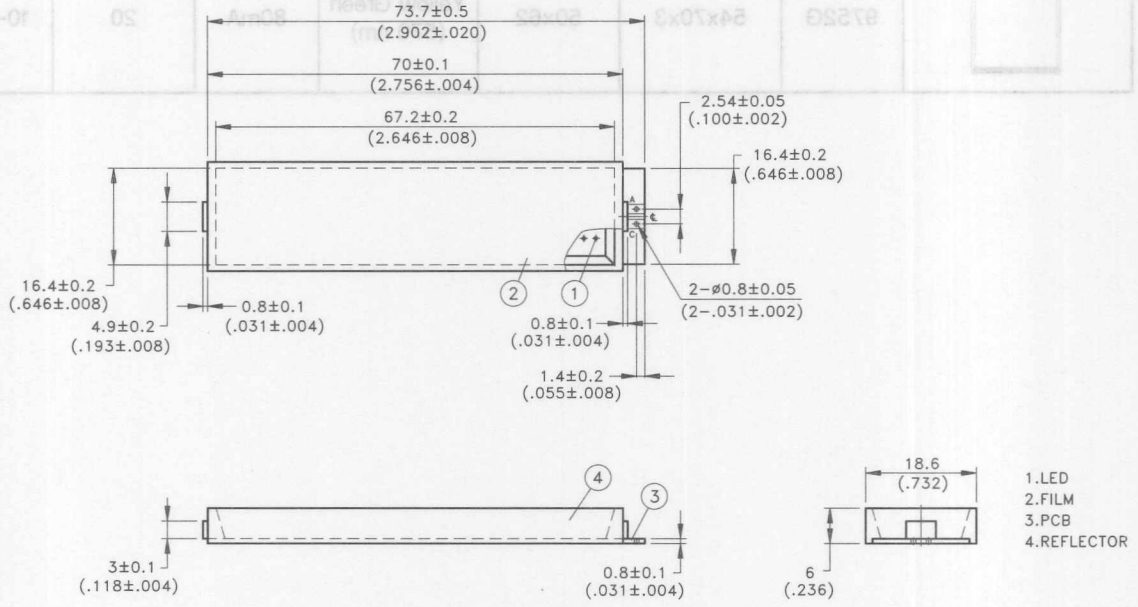
Features

- Free design according to install to "LCD" module and assemble easily.
- Mechanically and spectrally matched to the "LED" equipment.
- Excellent mechanically strength and electrical stability.
- Concentrate configuration designed reduced thickness.
- Reliable performance characteristics and guarded equipment.

Description

The LBL-9316G is a C.O.B. type LED light source with green source color developed as a LCD back light-source,which is used for computer,communication and electrical equipment. It is also can be the back light in the viewing area panel and sign indicator.

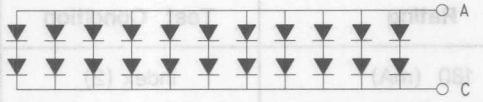
Package Dimensions



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.

Schematic Circuit Diagram

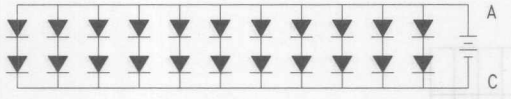


A=Anode
B=Cathode

2 × 11=22 (LED Numbers)

Optical Characteristics (Luminous Intensity and Luminous Tolerance)

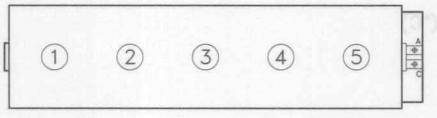
Testing Circuit



Current : I = 90mA
Ambient Temperature : Ta=25 ℃

Measured Method

" Detecting Hole " Diameter ϕ3mm



- (Effective spatial distribution)
- 1 to 5 Per-position measured luminous Intensity.

Rating

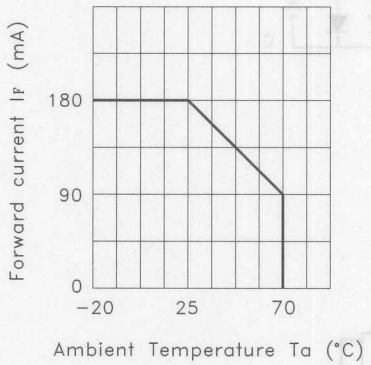
Item	Rating			Unit	Reference
	MIN.	TYP.	MAX.		
Luminous Intensity	93	115	–	cd / ㎡	
Luminous Tolerance	–	30	50	%	index (1)

* Index (1) luminous tolerance = $\frac{\text{B (MAX.)-B (MIN.)}}{\text{B (MAX.)}}$ × 100 %

Absolute Maximum Rating

Parameter	Symbol	Rating	Test Condition
Peak Forward Current	I_F	180 (mA)	index (2)
Reverse Voltage	V_R	8 (V)	index (2)
Power Dissipation	P_O	0.79 (W)	index (2)
Operating Temperature	T_{opr}	-20 to +70 (℃)	
Storage Temperature	T_{sto}	-30 to +80 (℃)	

* index (2): Ta=25 ℃



Electrical / Optical Characteristics

Parameter	Symbol	Rating			Test Condition	Ref
		MIN.	TYP.	MAX.		
Forward Voltage	V_F	3.8 V	4.1 V	4.4 V	I_F = 90 mA	Ta=25 ℃
Peak Emission Wavelength	λ_P	–	570 nm	–	I_F = 20 mA	index (3)
Reverse Current	I_R	–	–	1.1 mA	V_R = 8 V	Ta=25 ℃
Spectral Line Half Width	$\Delta\lambda$	–	30 nm	–	I_F = 20 mA	

* index (3) : Source Color (Yellow / Green Dice)

Back Light

LBL-9667G

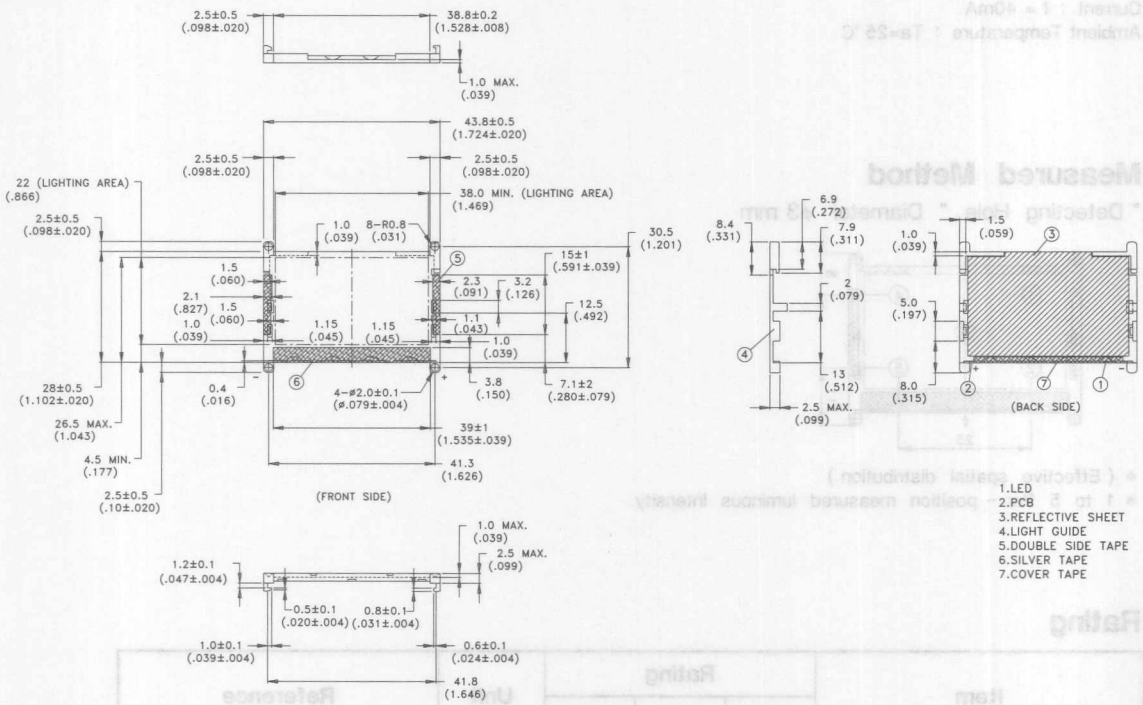
Features

- Free design according to install to " LCD " module and assemble easily.
- Mechanically and spectrally matched to the " LED " equipment.
- Excellent mechanically strength and electrical stability.
- Concentrate configuration designed reduced thickness.
- Reliable performance characteristics and guarded equipment.

Description

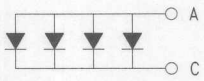
The LBL-9667G is a cellular phone type LED light source with green source color developed as a LCD back light source, which is used for computer, communication and electrical equipment. It is also can be the back light in the viewing area panel and sign indicator.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.2mm (.008") unless otherwise noted.

Schematic Circuit Diagram



A=Anode
B=Cathode

(1 × 4) = 4 (LED Numbers)

Optical Characteristics
(Luminous Intensity and Luminous Tolerance)

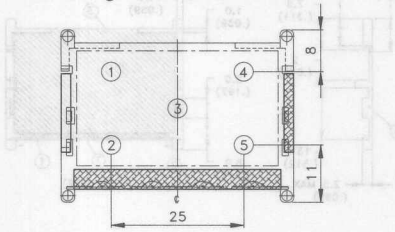
Testing Circuit



Current : I = 40mA
Ambient Temperature : Ta=25 ℃

Measured Method

" Detecting Hole " Diameter ϕ3 mm



* (Effective spatial distribution)
* 1 to 5 Per - position measured luminous Intensity.

Rating

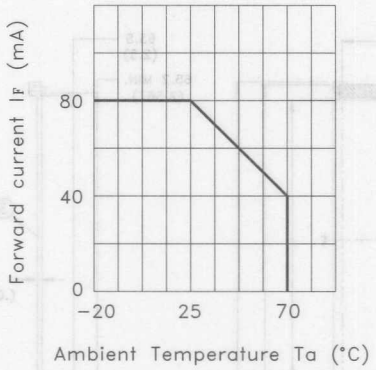
Item	Rating			Unit	Reference
	MIN.	TYP.	MAX.		
Luminous Intensity	6	9	–	cd / ㎡	
Luminous Tolerance	70	–	–	%	index (1)

*index (1) luminous tolerance= $\frac{\text{B (MIN.)}}{\text{B (MAX.)}} \times 100\%$

Absolute Maximum Rating

Parameter	Symbol	Rating	Test Condition
Peak Forward Current	I_F	80 (mA)	index (2)
Reverse Voltage	V_R	4 (V)	index (2)
Power Dissipation	P_O	200 (mW)	index (2)
Operating Temperature	T_{opr}	-20 to +70 (℃)	
Storage Temperature	T_{sto}	-30 to +85 (℃)	

* index (2) : Ta=25 ℃



Electrical / Optical Characteristics

Parameter	Symbol	Rating			Test Condition	Ref
		MIN.	TYP.	MAX.		
Forward Voltage	V_F	–	2 V	2.2 V	I_F = 40 mA	Ta=25 ℃
Peak Emission Wavelength	λ_P	–	570 nm	–	I_F = 20 mA	index (3)
Reverse Current	I_R	–	–	10 μ A	V_R = 4 V	Ta=25 ℃
Spectral Line Half Width	$\Delta\lambda$	–	30 nm	–	I_F = 20 mA	

* index (3) : Source Color (Yellow / Green Dice)

LITEON

Back Light

LBL-9752G

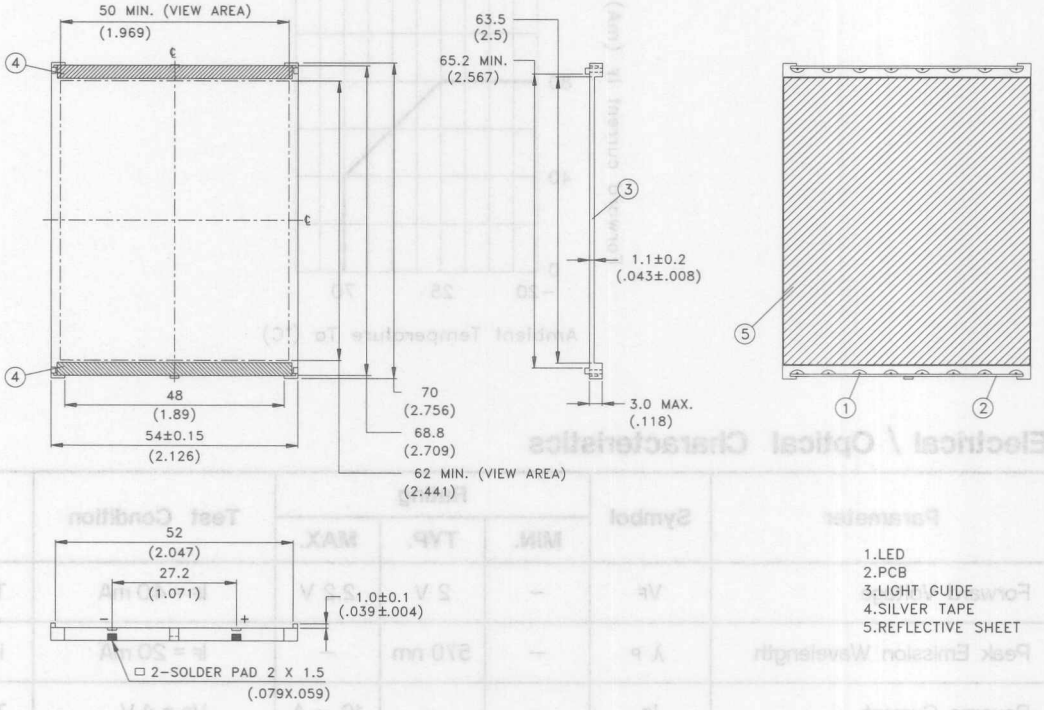
Features

- Free design according to install to " LCD " module and assemble easily.
- Mechanically and spectrally matched to the " LED " equipment.
- Excellent mechanically strength and electrical stability.
- Concentrate configuration designed reduced thickness.
- Reliable performance characteristics and guarded equipment.

Description

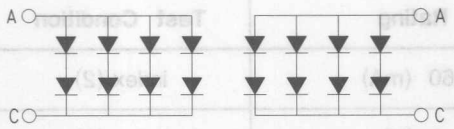
The LBL-9752G is a cellular phone type LED light source with green source color developed as a LCD back light source, which is used for computer, communication and electrical equipment. It is also can be the back light in the viewing area panel and sign indicator.

Package Dimensions



Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25mm (.010") unless otherwise noted.

Schematic Circuit Diagram

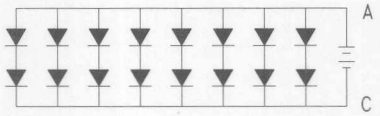


A=Anode
B=Cathode

2 × (2 × 4) = 16 (LED Numbers)

Optical Characteristics (Luminous Intensity and Luminous Tolerance)

Testing Circuit



Current : I = 80mA
Ambient Temperature : Ta=25 ℃

Measured Method

" Detecting Hole " Diameter ϕ3 mm



* (Effective spatial distribution)
* 1 to 5 Per - position measured luminous Intensity.

Rating

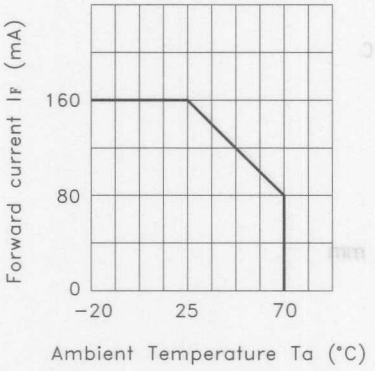
Item	Rating			Unit	Reference
	MIN.	TYP.	MAX.		
Luminous Intensity	15	20	–	cd / ㎡	
Luminous Tolerance	–	–	50	%	index (1)

*index (1) luminous tolerance= $\frac{B\ (MAX)-B\ (MIN.)}{B\ (MAX.)} \times 100\%$

Absolute Maximum Rating

Parameter	Symbol	Rating	Test Condition
Peak Forward Current	I_F	160 (mA)	index (2)
Reverse Voltage	V_R	8 (V)	index (2)
Power Dissipation	P_O	0.704 (W)	index (2)
Operating Temperature	T_{opr}	-20 to +70 (℃)	
Storage Temperature	T_{sto}	-30 to +80 (℃)	

* index (2) : Ta=25 ℃



Electrical / Optical Characteristics

Parameter	Symbol	Rating			Test Condition	Ref
		MIN.	TYP.	MAX.		
Forward Voltage	V_R	3.8 V	4.1 V	4.4 V	I_F = 80 mA	Ta=25 ℃
Peak Emission Wavelength	λ_P	–	570 nm	–	I_F = 20 mA	index (3)
Reverse Current	I_R	–	–	0.8 mA	V_R = 8 V	Ta=25 ℃
Spectral Line Half Width	$\Delta\lambda$	–	30 nm	–	I_F = 20 mA	

* index (3) : Source Color (Yellow / Green Dice)

11.LED LIGHT BARS & BAR GRAPH ARRAYS

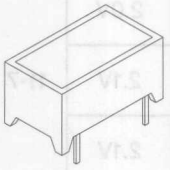
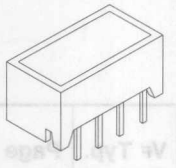
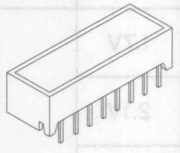
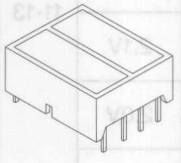
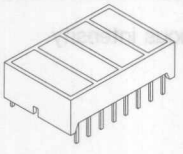
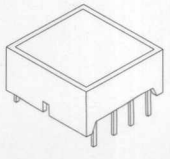
- SELECTION GUIDE 11-1
- LED LIGHT BARS 11-3
- LED BAR GRAPH ARRAYS 11-13

11. LED LIGHT BARS & BAR GRAPH ARRAYS

- SELECTION GUIDE 11-1
- LED LIGHT BARS 11-3
- LED BAR GRAPH ARRAYS 11-13

Selection Guide

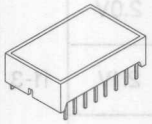
· LED Light Bars

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2*	VF Typ. @20mA	Page No.
	Package	Part No.	Color (λ P)	Lens				
	5 Pin DIP .100" Centers .550"Lx .295"Wx .315"H	LTL-57173HR	Hi. Eff. Red (635 nm)	Diffused	4.2 mcd	100 °	2.0V	11-3
		LTL-54173G	Green (565 nm)	Diffused	4.2 mcd	100 °	2.1V	
		LTL-53173Y	Yellow (585 nm)	Diffused	4.2 mcd	100 °	2.1V	
	4 Pin In. Line .100" Centers .400"Lx .195"Wx .240"H	LTL-2300HR	Hi. Eff. Red (635 nm)	Diffused	4.2 mcd	100 °	2.0V	
		LTL-2500G	Green (565 nm)	Diffused	4.2 mcd	100 °	2.1V	
		LTL-2400Y	Yellow (585 nm)	Diffused	4.2 mcd	100 °	2.1V	
	8 Pin In. Line .100" Centers .800"Lx .195"Wx .240"H	LTL-2350HR	Hi. Eff. Red (635 nm)	Diffused	8.0 mcd	100 °	2.0V	
		LTL-2550G	Green (565nm)	Diffused	8.0 mcd	100 °	2.1V	
		LTL-2450Y	Yellow (585 nm)	Diffused	8.0 mcd	100 °	2.1V	
	8 Pin DIP .100" Centers .400"Lx .400"Wx .240"H	LTL-2600HR	Hi. Eff. Red (635 nm)	Diffused	4.2 mcd	100 °	2.0V	11-7
		LTL-2800G	Greem (565 nm)	Diffused	4.2 mcd	100 °	2.1V	
		LTL-2700Y	Yellow (585 nm)	Diffused	4.2 mcd	100 °	2.1V	
	16 Pin DIP .100" Centers .800"Lx .400"Wx .240"H	LTL-2620HR	Hi. Eff. Red (635 nm)	Diffused	4.2 mcd	100 °	2.0V	
		LTL-2820G	Green (565 nm)	Diffused	4.2 mcd	100 °	2.1V	
		LTL-2720Y	Yellow (585 nm)	Diffused	4.2 mcd	100 °	2.1V	
	8 Pin DIP .100" Centers .400"Lx .400"Wx .240"H	LTL-2655HR	Hi. Eff. Red (635 nm)	Diffused	8.0 mcd	100 °	2.0V	
		LTL-2855G	Green (565 nm)	Diffused	8.0 mcd	100 °	2.1V	
		LTL-2755Y	Yellow (585 nm)	Diffused	8.0 mcd	100 °	2.1V	

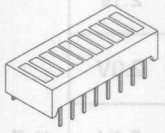
Notes:*2 θ 1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

Selection Guide

· LED Light Bars

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2*	VF Typ. @20mA	Page No.
	Package	Part No.	Color (λ P)	Lens				
	16 Pin DIP .100" Centers .800" Lx .400" Wx .240" H	LTL-2685HR	Hi. Eff. Red (635 nm)	Diffused	16.0 mcd	100 °	2.0V	11-7
		LTL-2885G	Green (565 nm)	Diffused	16.0 mcd	100 °	2.1V	
		LTL-2785Y	Yellow (585 nm)	Diffused	16.0 mcd	100 °	2.1V	

· LED Bar Graph Arrays

Outline	Device		Description		Luminous Intensity Iv Typ. @10mA	Typical Viewing Angle 2 θ 1/2*	VF Typ. @20mA	Page No.
	Package	Part No.	Color (λ P)	Lens				
	20 Pin DIP .100" Centers .955" Lx .400" Wx .315" H	LTA-1000R	Red (655 nm)	Diffused	0.5 mcd	100 °	1.7V	11-13
		LTA-1000P	Bright Red (697 nm)	Diffused	0.7mcd	100 °	2.1V	
		LTA-1000G	Green (565nm)	Diffused	2.0 mcd	100 °	2.1V	
		LTA-1000Y	Yellow (585 nm)	Diffused	2.0 mcd	100 °	2.1V	
		LTA-1000E	Orange (630 nm)	Diffused	2.0 mcd	100 °	2.0V	
		LTA-1000HR	Hi. Eff. Red (635 nm)	Diffused	2.0 mcd	100 °	2.0V	

Notes: 1. *2 θ 1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
2. Sepecifications are subject to change without notice.
3. Brightness data for reference only.

LITEON 12.7mm × 6.35mm Light Bar

LTL-50000 Series

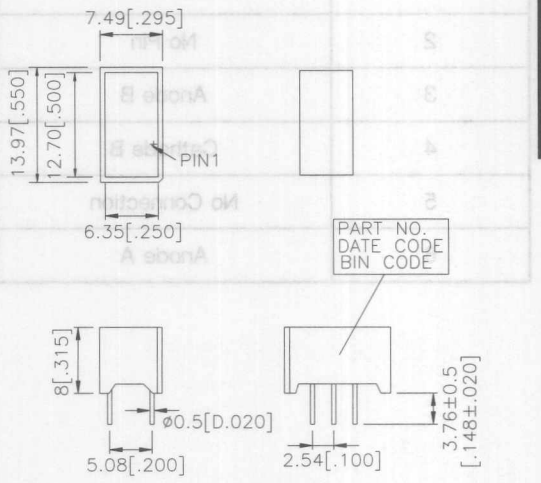
Features

- 12.7mm × 6.35mm rectangular light bar.
- Choices of three bright colors-green/yellow/high efficiency red.
- Large, bright, uniform light emitting areas.
- Low power requirement.
- Excellent ON-OFF contrast.
- Can be used with panel and legend mount.
- Easy mounting on P.C. board.
- Categorized for light output.
- Yellow and green categorized for dominant wavelength.

Description

The LTL-53173Y/54173G/57173HR series bars are rectangular light sources designed for a variety of applications where a large bright source of light is reguired. These light bars are configured in dual-in-line packages. The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. The green Devices have green bars, yellow devices have yellow bars, and high-efficiency red devices have red bars.

Package Dimensions



Notes : All dimensions are in millimeters (inches).
Tolerance: ± 0.25mm (0.010") unless otherwise noted.

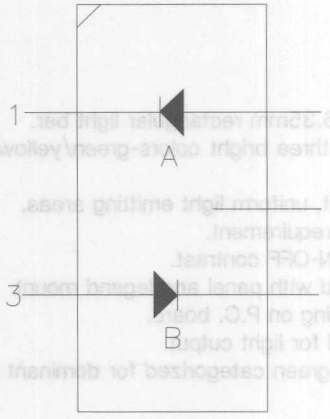
Devices

Part No. LTL-			Description
Green	Yellow	Hi.-Eff. Red	
54173G	53173Y	57173HR	Universal, Rectangular Bar

Pin Connection

Pin No.	Connection
1	Cathode A
2	No Pin
3	Anode B
4	Cathode B
5	No Connection
6	Anode A

Internal Circuit Diagram



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Yellow	Hi.-Eff. Red	Unit
Power Dissipation Per Chip	75	60	75	mW
Peak Forward Current Per Chip (1/10 Duty Cycle, 0.1ms Pulse Width)	100	80	100	mA
Continuous Forward Current Per Chip Derating Linear From 25 ℃ Per Chip	25 0.33	20 0.27	25 0.33	mA mA/ ℃
Reverse Voltage Per Chip	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta =25 ℃

LTL-54173G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	2.3	4.2		mcd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V

LTL-53173Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	2.3	4.2		mcd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V

LTL-57173HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	2.3	4.2		mcd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Chip	VF		2.0	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

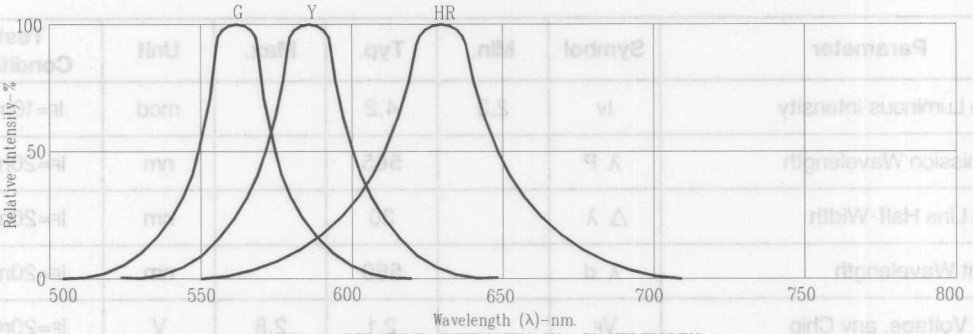


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

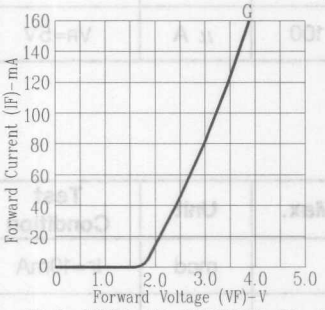


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

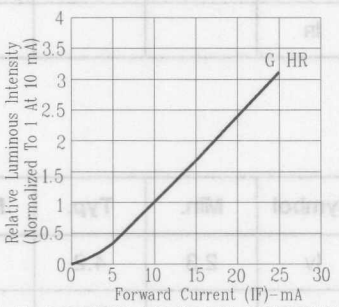


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

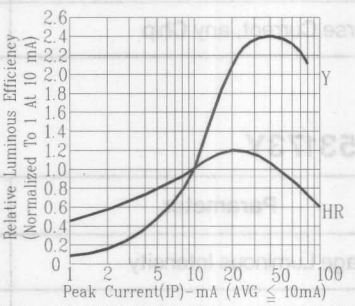


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

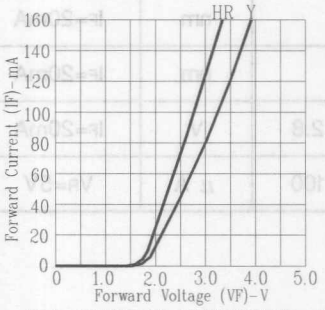


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

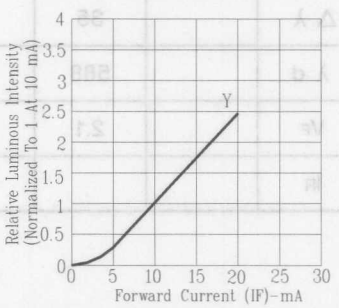


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

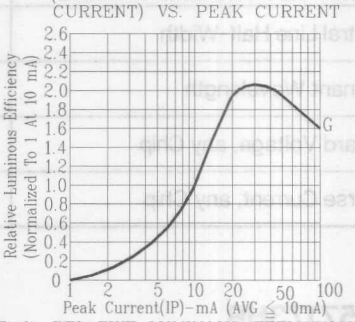


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

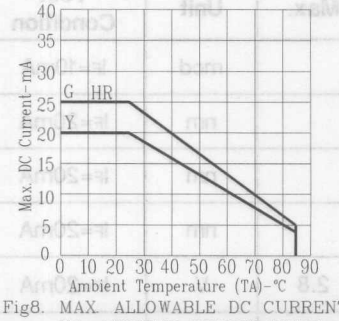


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

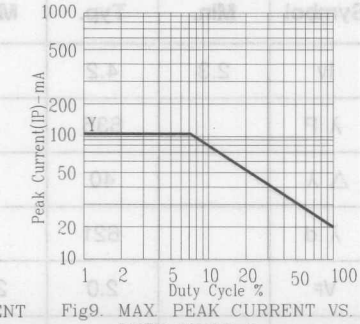


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

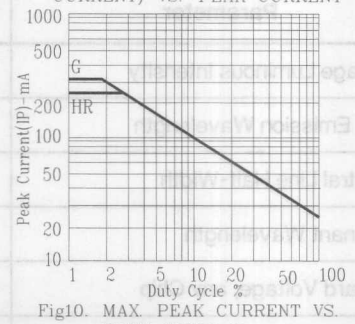


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN Y=YELLOW HR=HI.-EFF.RED (REFRESH RATE 1KHz)

LITEON

Light Bars

LTL-2000 Series

Features

- Rectangular light bar.
- Choices of three bright colors-green/yellow/high efficiency red.
- Large, bright, uniform light emitting areas.
- Low power requirement.
- Excellent ON-OFF contrast.
- Can be used with panel and legend mount.
- Easy mounting on P.C. board.
- Categorized for light output.
- Yellow and green categorized for dominant wavelength.

Description

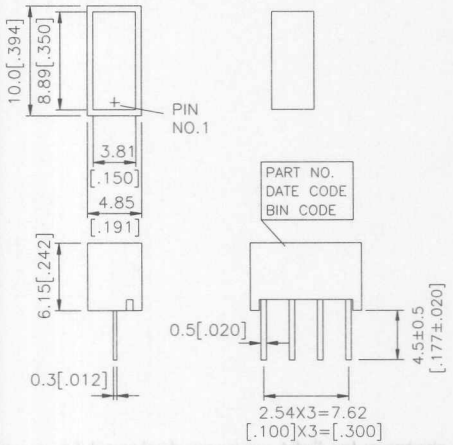
The LTL-2300/2400/2500/2600/2700/2800 series light bars are rectangular light sources designed for a variety of applications where a large bright source of light is required. These light bars are configured in single-in-line and dual-in-line packages. The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. All devices have white bar.

Devices

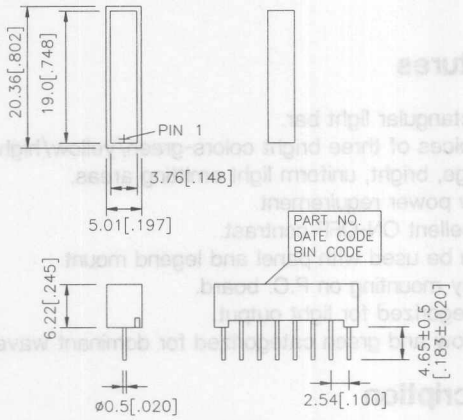
Part No.			Size of Light Emitting Areas	Package Dimension		Internal Circuit Diagram
Green	Yellow	Hi.-Eff. Red				
2500G	2400Y	2300HR	8.89mm × 3.81mm(.350 in × .150 in.)	A	▭	A
2550G	2450Y	2350HR	19mm × 3.76mm(.748 in × .148 in.)	B	▭	B
2800G	2700Y	2600HR	8.89mm × 3.81mm(.350 in × .150 in.)	C	▯	C
2855G	2755Y	2655HR	8.89mm × 8.89mm(.350 in × .350 in.)	D	□	D
2820G	2720Y	2620HR	8.89mm × 3.81mm(.350 in × .150 in.)	E	▯▯▯	E
2885G	2785Y	2685HR	8.89mm × 19.05mm(.350 in × .750 in.)	F	▯	F

Package Dimensions

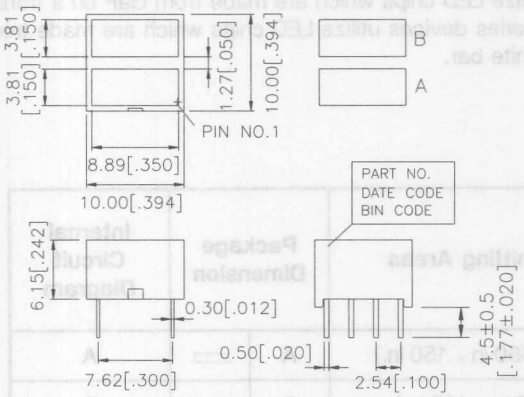
A. LTL-2300/2400/2500



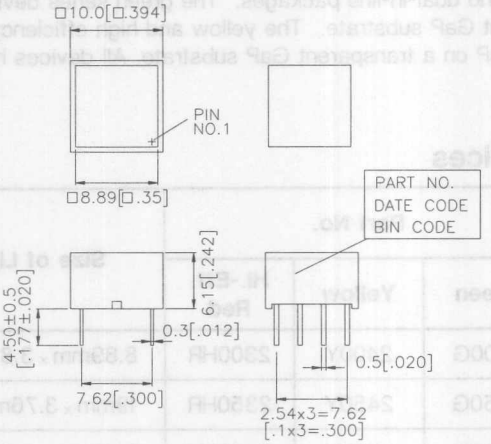
B. LTL-2350/2450/2550



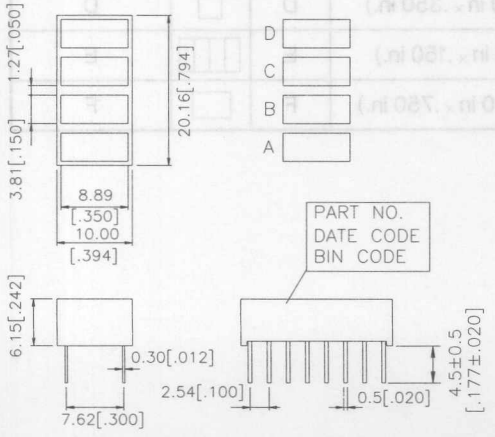
C. LTL-2600/2700/2800



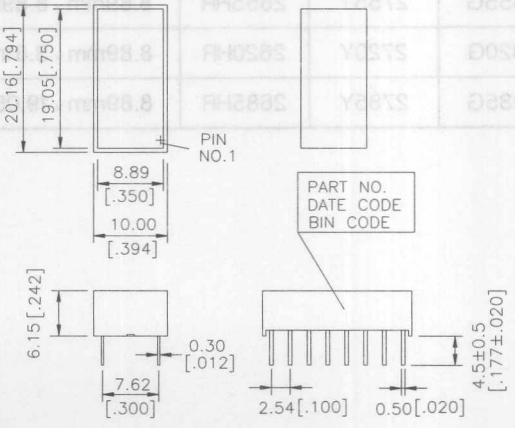
D. LTL-2655/2755/2855



E. LTL-2620/2720/2820



F. LTL-2685/2785/2885



Notes : All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.010") unless otherwise noted.

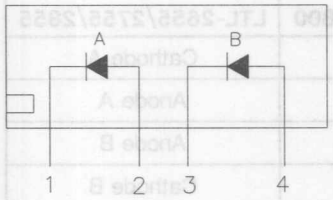
Pin Connection

Pin No.	Connection			
	A LTL-2300/2400/2500	B LTL-2350/2450/2550	C LTL-2600/2700/2800	D LTL-2655/2755/2855
1	Cathode A	Cathode A	Cathode A	Cathode A
2	Anode A	Anode A	Anode A	Anode A
3	Cathode B	Cathode B	Anode B	Anode B
4	Anode B	Anode B	Cathode B	Cathode B
5		Cathode C	Cathode C	Cathode C
6		Anode C	Anode C	Anode C
7		Cathode D	Anode D	Anode D
8		Anode D	Cathode D	Cathode D

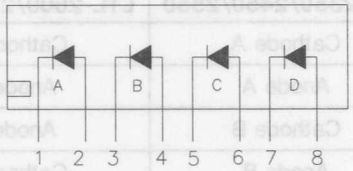
Pin No.	Connection	
	E. LTL-2620/2720/2820	F. LTL-2685/2785/2885
1	Cathode A	Cathode A
2	Anode A	Anode A
3	Anode B	Anode B
4	Cathode B	Cathode B
5	Cathode C	Cathode C
6	Anode C	Anode C
7	Anode D	Anode D
8	Cathode D	Cathode D
9	Cathode E	Cathode E
10	Anode E	Anode E
11	Anode F	Anode F
12	Cathode F	Cathode F
13	Cathode G	Cathode G
14	Anode G	Anode G
15	Anode H	Anode H
16	Cathode H	Cathode H

Internal Circuit Diagrams

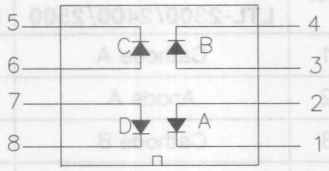
A. LTL-2300/2400/2500



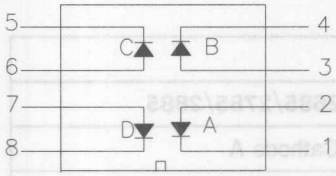
B. LTL-2350/2450/2550



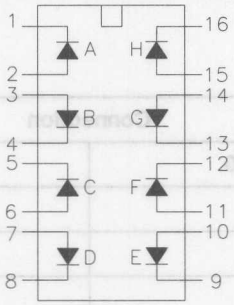
C. LTL-2600/2700/2800



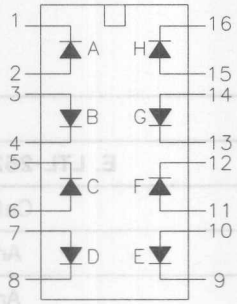
D. LTL-2655/2755/2855



E. LTL-2620/2720/2820



F. LTL-2685/2785/2885



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Yellow	Hi.-Eff. Red	Unit
Power Dissipation Per Chip	75	60	75	mW
Peak Forward Current Per Chip (1/10 Duty Cycle, 0.1ms Pulse Width)	100	80	100	mA
Continuous Forward Current Per Chip Derating Linear From 25 ℃ Per Chip	25 0.33	20 0.27	25 0.33	mA mA/ ℃
Reverse Voltage Per Chip	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

Hi.-Eff Red LTL-2300HR/2600HR

Parameter	LTL-	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Bar	2300	Iv	1.4	4.2		mcd	IF=10mA
	2350		3.5	8			
	2600		1.4	4.2			
	2620		1.4	4.2			
	2655		3.5	8			
	2685		7	16			
Peak Emission Wavelength		λ P		635		nm	IF=20mA
Spectral Line Half-Width		Δ λ		40		nm	IF=20mA
Dominant Wavelength		λ d		621		nm	IF=20mA
Forward Voltage, any Bar		VF		2.0	2.8	V	IF=20mA
Reverse Current, any Bar		IR			100	μ A	VR=5V

Yellow LTL-2400Y/2700Y

Parameter	LTL-	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Bar	2400	Iv	1.4	4.2		mcd	IF=10mA
	2450		3.5	8			
	2700		1.4	4.2			
	2720		1.4	4.2			
	2755		3.5	8			
	2785		7	16			
Peak Emission Wavelength		λ P		585		nm	IF=20mA
Spectral Line Half-Width		Δ λ		35		nm	IF=20mA
Dominant Wavelength		λ d		588		nm	IF=20mA
Forward Voltage, any Chip		VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip		IR			100	μ A	VR=5V

Green LTL-2500G/2800G

Parameter	LTL-	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Bar	2500	Iv	1.4	4.2		mcd	IF=10mA
	2550		3.5	8			
	2800		1.4	4.2			
	2820		1.4	4.2			
	2855		3.5	8			
	2885		7	16			
Peak Emission Wavelength		λ P		565		nm	IF=20mA
Spectral Line Half-Width		Δ λ		30		nm	IF=20mA
Dominant Wavelength		λ d		569		nm	IF=20mA
Forward Voltage, any Chip		VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip		IR			100	μ A	VR=5V

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

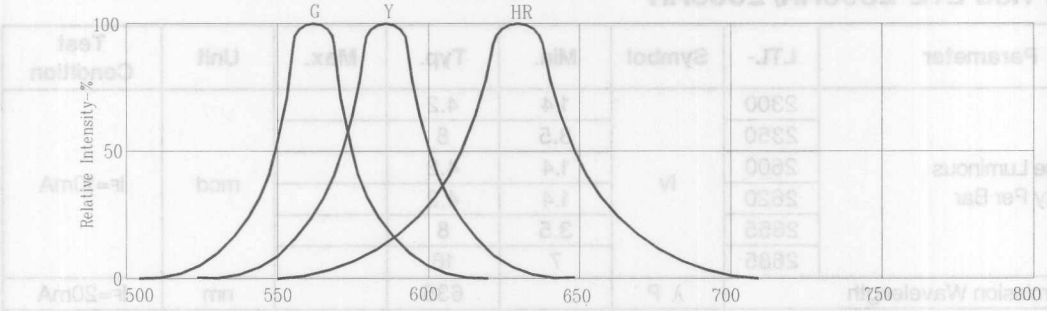


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

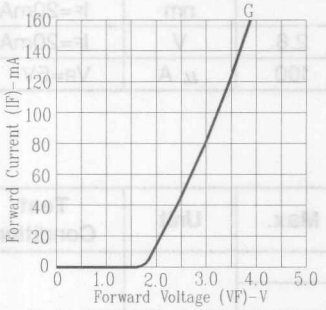


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

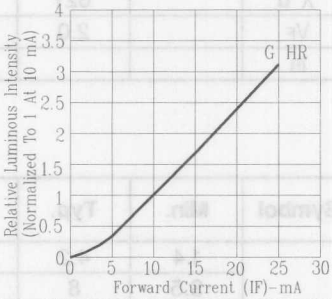


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

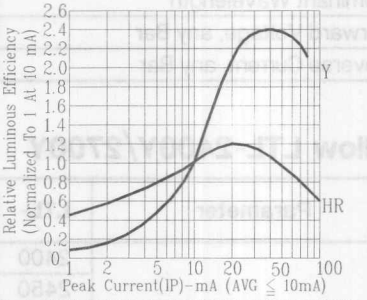


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

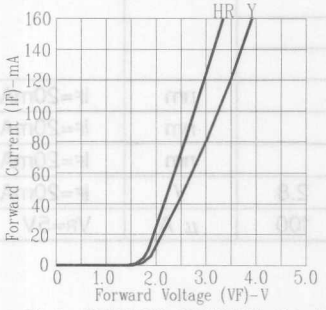


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

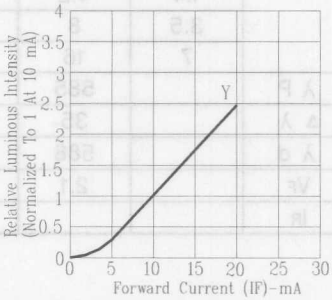


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

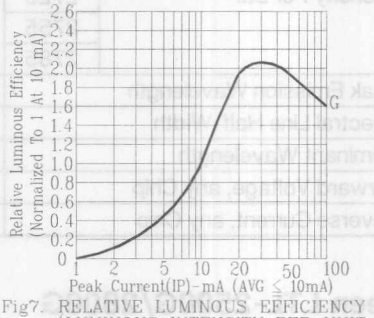


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

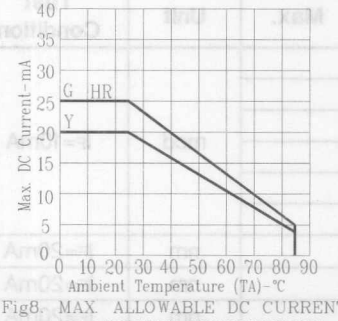


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

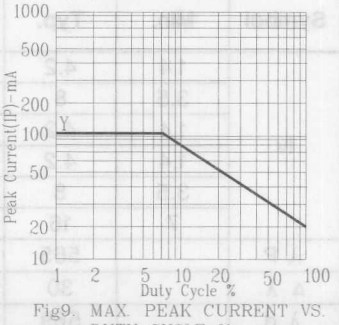


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)



Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN Y=YELLOW HR=HI.-EFF.RED (REFRESH RATE 1KHz)

LITEON

Bar Graph Arrays

LTA-1000 Series

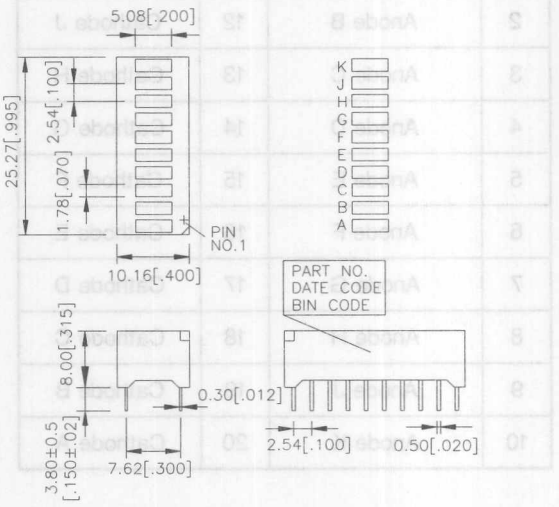
Features

- Large segments, closely spaced.
- Choices of six bright colors-red/bright red/green /yellow/orange/high efficiency red.
- End stackable.
- Fast switching, excellent for multiplexing.
- Low power requirement.
- Wide viewing angle.
- Categorized for luminous intensity.
- Easy mounting on P.C. board or socket.

Description

The LTA-1000 series are ten rectangular light sources array displays designed for a variety of applications where a continuously large, bright source of light is required. The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow, orange and high efficiency red series devices utilize LED chips which are made from GaAsP om a transparent GaP substrate. The red, bright red, green, yellow, and orange devices have gray face and white segments. The high efficiency red devices have red face and red segments.

Package Dimensions



Notes : All dimensions are in millimeters (inches).
Tolerance: ± 0.25mm (0.010") unless otherwise noted.

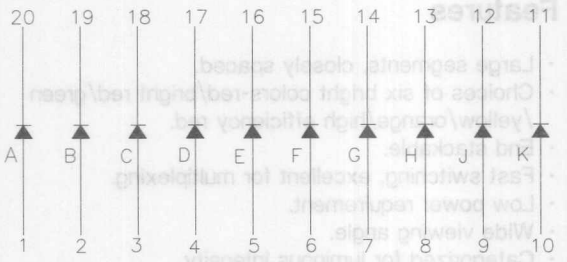
Devices

Part No. LTA-						Description
Red	Bright Red	Green	Yellow	Orange	Hi.-Eff. Red	
1000R	1000P	1000G	1000Y	1000E	1000HR	Universal, Ten Rectangular Bar

Pin Connection

Pin No.	Connection	Pin No.	Connection
1	Anode A	11	Cathode K
2	Anode B	12	Cathode J
3	Anode C	13	Cathode H
4	Anode D	14	Cathode G
5	Anode E	15	Cathode F
6	Anode F	16	Cathode E
7	Anode G	17	Cathode D
8	Anode H	18	Cathode C
9	Anode J	19	Cathode B
10	Anode K	20	Cathode A

Internal Circuit Diagram



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Hi.-Eff. Red	Unit
Power Dissipation Per Chip	55	40	75	60	75	75	mW
Peak Forward Current Per Chip (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	100	mA
Continuous Forward Current Per Chip Derating Linear From 25 ℃ Per Chip	25 0.33	15 0.20	25 0.33	20 0.27	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Chip	5	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃						
Storage Temperature Range	-35 ℃ to +85 ℃						
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃							

Electrical/Optical Characteristics at Ta=25 ℃

LTA-1000R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, any Chip	VF		1.7	2.0	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTA-1000P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	210	700		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTA-1000G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	540	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTA-1000Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	540	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, any Chip	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTA-1000E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	540	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Chip	VF		2.0	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTA-1000HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	540	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Chip	VF		2.0	2.8	V	IF=20mA
Reverse Current, any Chip	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes : 1. Clean only in water, isopropanol,ethanol,freon TF (or equivalent).
2. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (Commission International De L'Eclairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

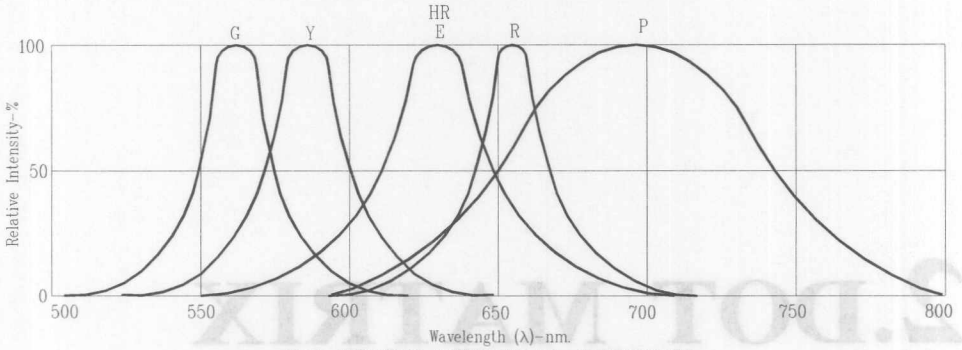


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

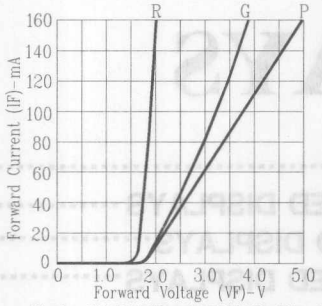


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

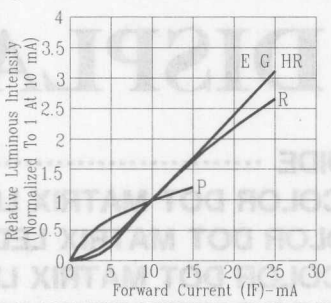


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

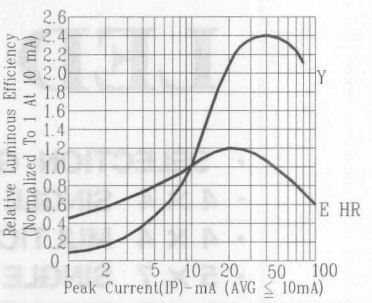


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

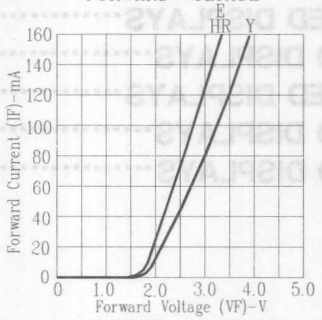


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

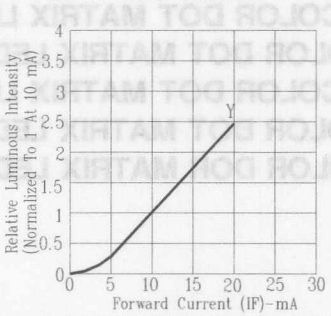


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

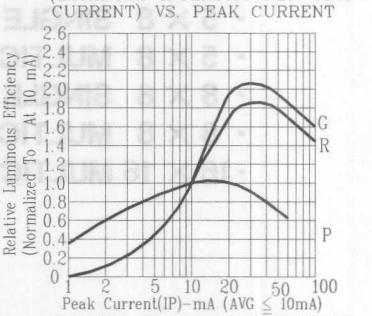


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

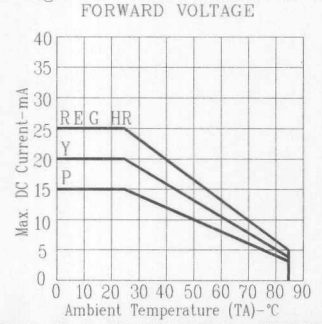


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE

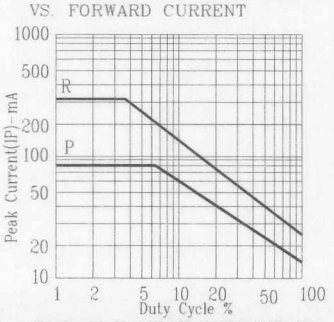


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

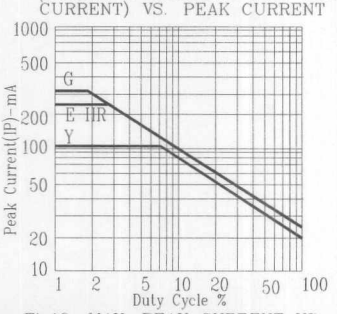


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

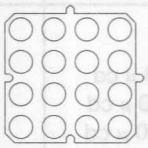
NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE HR=HI.-EFF.RED (REFRESH RATE 1KHz)

12. DOT MATRIX LED DISPLAYS

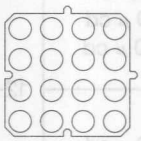
- SELECTION GUIDE 12-1
- 4 × 4 SINGLE COLOR DOT MATRIX LED DISPLAYS 12-7
- 4 × 4 MULTICOLOR DOT MATRIX LED DISPLAYS 12-7
- 5 × 7 SINGLE COLOR DOT MATRIX LED DISPLAYS 12-12
- 5 × 7 MULTICOLOR DOT MATRIX LED DISPLAYS 12-20
- 5 × 8 SINGLE COLOR DOT MATRIX LED DISPLAYS 12-49
- 5 × 8 MULTICOLOR DOT MATRIX LED DISPLAYS 12-49
- 8 × 8 SINGLE COLOR DOT MATRIX LED DISPLAYS 12-61
- 8 × 8 MULTICOLOR DOT MATRIX LED DISPLAYS 12-65
- 16 × 16 MULTICOLOR DOR MATRIX LED DISPLAYS 12-75

Selection Guide

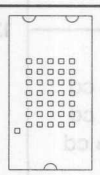
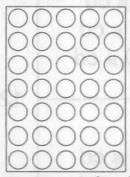
· 4 × 4 Single Color Dot Matrix LED Displays

Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 47.1mm(9 ϕ) Dual-In-Line 2.0"H × 2.0"W × .34"D	LTP- 2344G 2344E 2344C	 Green(565 nm) Orange(630nm) Ultra Bright Red(660nm)	 Anode Row, Cathode Column	 11 mcd 11 mcd 28 mcd	12-7

· 4 × 4 Multicolor Dot Matrix LED Displays

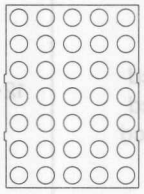
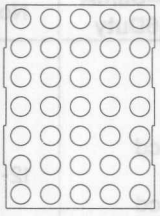
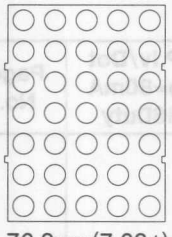
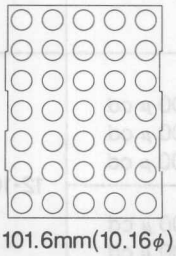
Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 47.1mm(9 ϕ) Dual-In-Line 2.0"H × 2.0"W × .34"D	LTP- 2844A3	Green(565 nm) & Orange(630nm)	Anode Row, Cathode Column	11 mcd 11 mcd	12-7

· 5 × 7 Single Color Dot Matrix LED Displays

Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 7.62mm(.3") Dual-In-Line .73"H × .39"W × .12"D	LTP- 305R 305G 305HR	 Red(655nm) Green(565nm) Hi.-Eff.Red(635nm)	 Anode Column, Cathode Row	 400 μ cd 1600 μ cd 1600 μ cd	12-12
 17.22mm(2ϕ) Dual-In-Line .7"H × .5"W × .25"D	LTP- 747G 747E 747C	 Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	 Anode Column, Cathode Row	 2000 μ cd 2000 μ cd 9000 μ cd	12-16
	757G 757E 757C	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Cathode Column Anode Row	2000 μ cd 2000 μ cd 9000 μ cd	

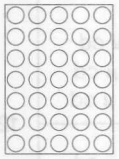
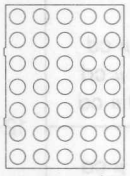
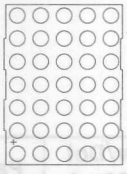
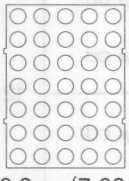
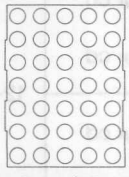
Selection Guide

· 5 × 7 Single Color Dot Matrix LED Displays

Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 30.42mm(3φ) Dual-In-Line 1.25"H × .9"W × .31"D	LTP-1457AG 1457AE 1457AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	4000 μ cd 4000 μ cd 12000 μ cd	12-25
	1557AG 1557AE 1557AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Cathode Column, Anode Row	4000 μ cd 4000 μ cd 12000 μ cd	
 50.8mm(5φ) Dual-In-Line 2.1"H × 1.5"W × .34"D	LTP-2057AG 2057AE 2057AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	4800 μ cd 4800 μ cd 12000 μ cd	12-30
	2157AG 2157AE 2157AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Cathode Column, Anode Row	4800 μ cd 4800 μ cd 12000 μ cd	
 76.2mm(7.62φ) Dual-In-Line 3.2"H × 2.2"W × .36"D	LTP-3057AG 3057AE 3057AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	9600 μ cd 9600 μ cd 20000 μ cd	12-36
	3157AG 3157AE 3157AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Cathode Column, Anode Row	9600 μ cd 9600 μ cd 20000 μ cd	
 101.6mm(10.16φ) Dual-In-Line 4.2"H × .3"W × .51"D	LTP-4057AG 4057AE 4057AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	9600 μ cd 9600 μ cd 20000 μ cd	12-43
	4157AG 4157AE 4157AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Cathode Column, Anode Row	9600 μ cd 9600 μ cd 20000 μ cd	

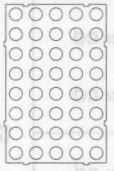
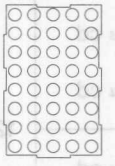
Selection Guide

· 5 × 7 Multicolor Dot Matrix LED Displays

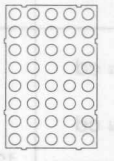
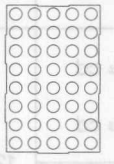
Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 17.2mm(2φ) Dual-In-Line .7"H × .5"W × .25"D	LTP-7057M	Green(565nm) & Orange(630nm)	Anode Column Cathode Row	2300 μ cd 2300 μ cd	12-20
	LTP-7157M-02	Green(565nm) & Orange(630nm)	Anode Row Cathode Column	2300 μ cd 2300 μ cd	
 30.48mm(3φ) Dual-In-Line 1.25"H × .9"W × .31"D	LTP-1257AA	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	4000 μ cd 4000 μ cd	12-25
	1357AA	Green(565nm) & Orange(630nm)	Cathode Column, Anode Row	4000 μ cd 4000 μ cd	
 50.8mm(5φ) Dual-In-Line 2.1"H × 1.5"W × .34"D	LTP-2657AA	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	4800 μ cd 4800 μ cd	12-30
	2757AA	Green(565nm) & Orange(630nm)	Cathode Column, Anode Row	4800 μ cd 4800 μ cd	
 76.2mm(7.62φ) Dual-In-Line 3.1"H × 2.2"W × .35"D	LTP-3257AA	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	9600 μ cd 9600 μ cd	12-36
	3357AA	Green(565nm) & Orange(630nm)	Cathode Column, Anode Row	9600 μ cd 9600 μ cd	
 101.6mm(10.16φ) Dual-In-Line 4.2"H × 3"W × .51"D	LTP-4257AA	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	9600 μ cd 9600 μ cd	12-43
	4357AA	Green(565nm) & Orange(630nm)	Cathode Column, Anode Row	9600 μ cd 9600 μ cd	

Selection Guide

· 5 × 8 Single Color Dot Matrix LED Displays

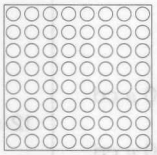
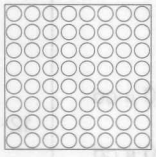
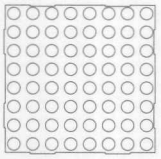
Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 35.76mm(3φ) Dual-In-Line 1.47"H × .9"W × .31"D	LTP-14058AG 14058AE 14058AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	4000 μ cd 4000 μ cd 12000 μ cd	12-49
	14158AG 14158AE 14158AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Cathode Column, Anode Row	4000 μ cd 4000 μ cd 12000 μ cd	
 58.42mm(5φ) Dual-In-Line 2.4"H × 1.5"W × .35"D	LTP-2058AG 2058AE 2058AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	4000 μ cd 4000 μ cd 12000 μ cd	12-55
	2158AG 2158AE 2158AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Cathode Column, Anode Row	4000 μ cd 4000 μ cd 12000 μ cd	

· 5 × 8 Multicolor Dot Matrix LED Displays

Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 35.76mm(3φ) Dual-In-Line 1.48"H × .9"W × .32"D	LTP-14858AA	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	4000 μ cd 4000 μ cd	12-49
	LTP-14958AA	Green(565nm) & Orange(630nm)	Cathode Column, Anode Row	4000 μ cd 4000 μ cd	
 58.42mm(5φ) Dual-In-Line 2.4"H × 1.5"W × .35"D	LTP-2458AA	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	4800 μ cd 4800 μ cd	12-55
	2558AA	Green(565nm) & Orange(630nm)	Cathode Column, Anode Row	4800 μ cd 4800 μ cd	

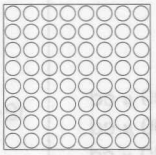
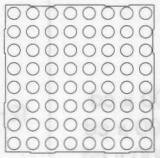
Selection Guide

· 8 × 8 Single Color Dot Matrix LED Displays

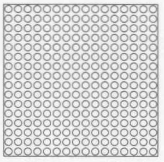
Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 19.4mm(1.9ϕ) Dual-In-Line .8"H × .8"W × .24"D	LTP-7188G 7188E 7188A	Green(565nm) Orange(630nm) Amber(600nm)	Anode Row, Cathode Column	2000 μ cd 2000 μ cd 2400 μ cd	12-61
 47.0mm(5ϕ) Dual-In-Line 1.9"H × 1.9"W × .35"D	LTP-18088G 18088E 18088C	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	4800 μ cd 4800 μ cd 12000 μ cd	12-65
 58.42mm(5ϕ) Dual-In-Line 2.4"H × 2.4"W × .36"D	LTP-2088AG 2088AE 2088AC	Green(565nm) Orange(630nm) Ultra Bright Red(660nm)	Anode Column, Cathode Row	4800 μ cd 4800 μ cd 12000 μ cd	12-70

Selection Guide

· 8 × 8 Multicolor Dot Matrix LED Displays

Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 47.0mm(5φ) Dual-In-Line 1.9"H × 1.9"W × .35"D	LTP-18188AA	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	4800 μ cd 4800 μ cd	12-65
 58.42mm(5φ) Dual-In-Line 2.4"H × 2.4"W × .36"D	LTP-2188A	Green(565nm) & Orange(630nm)	Anode Column, Cathode Row	4800 μ cd 4800 μ cd	12-70

· 16 × 16 Multicolor Dot Matrix LED Displays

Package	Part No.	Color (λp)	Description	TYP.Iv/Dot @Ip=80mA 1/16Duty	Page No.
 63.0mm(3φ) Dual-In-Line 2.5"H × 2.5"W × .67"D	LTP-254FFM-02	Green(565nm) & S/H GaAlAs Red(660nm)	Cathode Column Anode Row	570 μ cd 900 μ cd	12-75

9 ϕ 4 × 4 Single Color & Multicolor Dot Matrix LED Displays

LTP-2344
2844A3 Series

Features

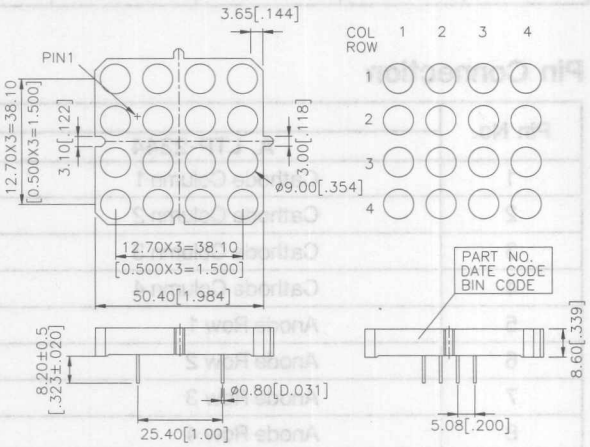
- 2.0 inch (50.80mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- Solid state reliability.
- 4 × 4 array with X-Y select.
- Compatible with usascll and ebcdic codes.
- Stackable horizontally.
- Choices of two matrix orientation. Cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and yellow (green and orange mixed)

Description

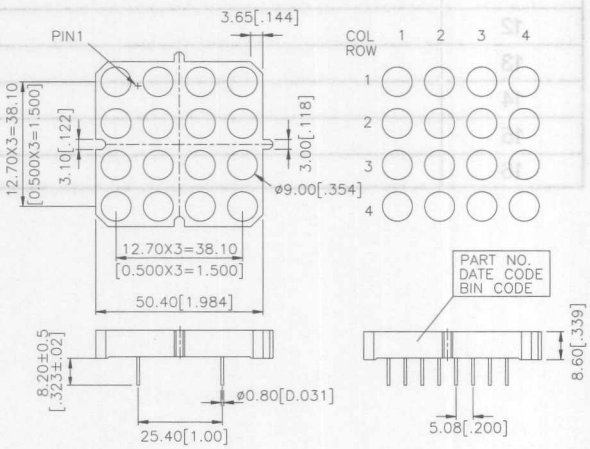
The LTP-2X44 series are 2.0 inch (50.80mm)matrix height 4 × 4 dot matrix displays.
The LTP-2844A3 are multicolor applicable displays. The multicolor displays have gray face and white dots.
The LTP-2344 series are single color displays. The green, orange displays have gray face and white dot color. The ultra bright red devices have red face and red dots.
The green series devices are made from GaP on a utilize LED chipse which transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-2344



B. LTP-2844A3



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

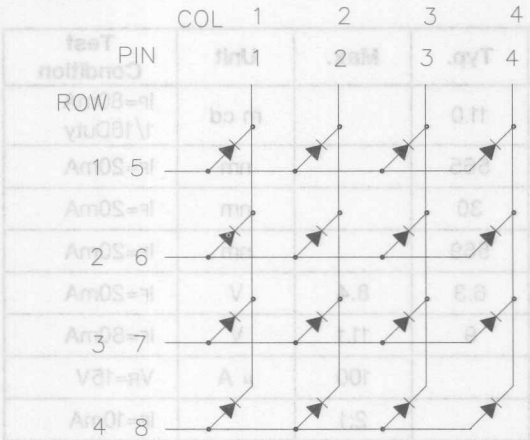
Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
2344G	2344E	2344C	–	Anode Row, cathode Column	A	A
–	–	–	2844A3	Anode Row, Cathode Column	B	B

Pin Connection

Pin No.	Connection	
	A. LTP-2344	B. LTP-2844A3
1	Cathode Column 1	Cathode Orange Column 1
2	Cathode Column 2	Cathode Green Column 1
3	Cathode Column 3	Cathode Orange Column 2
4	Cathode Column 4	Cathode Green Column 2
5	Anode Row 1	Cathode Orange Column 3
6	Anode Row 2	Cathode Green Column 3
7	Anode Row 3	Cathode Orange Column 4
8	Anode Row 4	Cathode Green Column 4
9		Anode Orange Row 1
10		Anode Green Row 1
11		Anode Orange Row 2
12		Anode Green Row 2
13		Anode Orange Row 3
14		Anode Green Row 3
15		Anode Orange Row 4
16		Anode Green Row 4

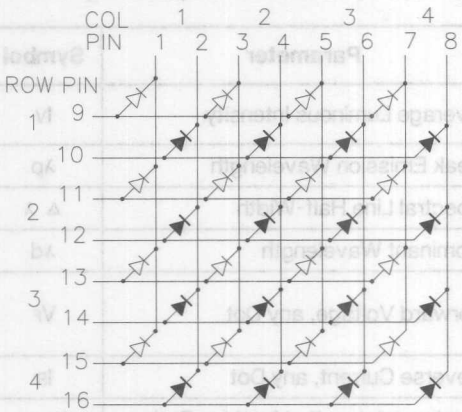
Internal Circuit Diagrams

A. LTP-2344



3 CHIPS IN SERIES

B. LTP-2844A3



STANDS FOR 3 ORANGE CHIPS IN SERIES.

STANDS FOR 3 GREEN CHIPS IN SERIES.

DOT MATRIX LED DISPLAYS

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	96	96	96	mW
Peak Forward Current Per Dot	90	90	110	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	11 0.15	11 0.15	14 0.19	mA mA ℃
Reverse Voltage Per Dot	15	15	15	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

LTP-2344G/2844A3 (Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	5.0	11.0		m cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		6.3	8.4	V	IF=20mA
			9	11.1	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=15V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2344E/2844A3 (Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	5.0	11.0		m cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		6	8.4	V	IF=20mA
			7.8	10.2	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=15V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2344C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	15.1	28		m cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		5.4	7.2	V	IF=20mA
			6	8.1	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=15V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperatrue Unless Otherwise Noted)

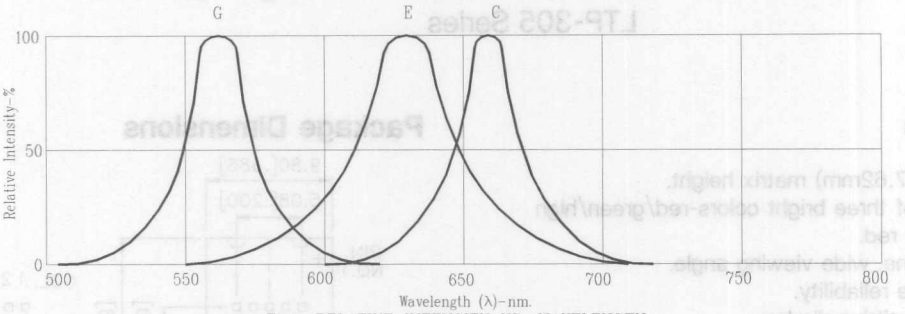


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

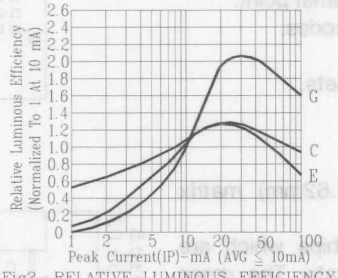


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

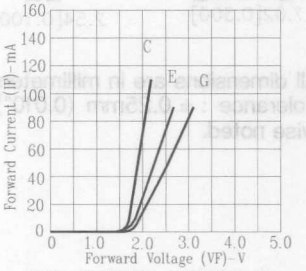


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

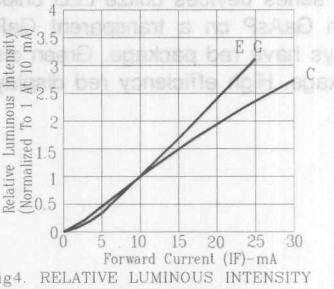


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

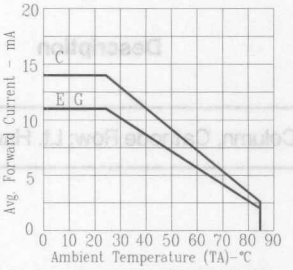


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

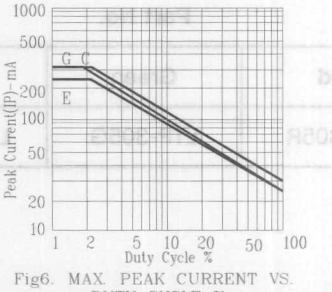


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

LITEON

0.3" 5 × 7 Single Color Dot Matrix LED Displays

LTP-305 Series

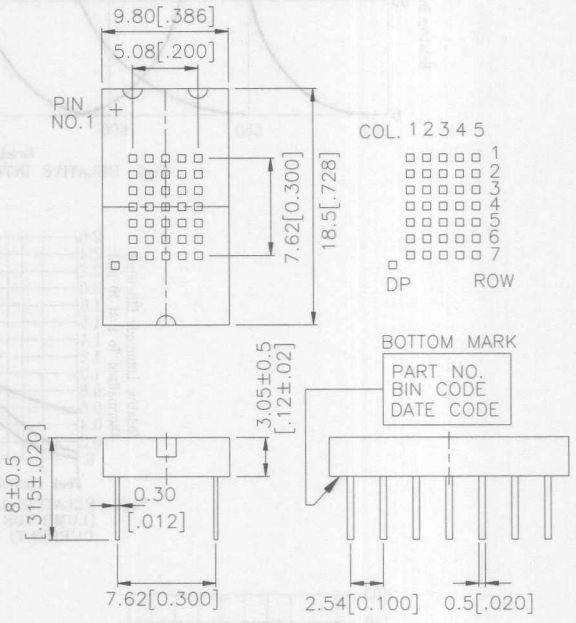
Features

- 0.3 inch (7.62mm) matrix height.
- Choices of three bright colors-red/green/high efficiency red.
- Single plane, wide viewing angle.
- Solid state reliability.
- 36 light emitting diodes.
- Low power requirements.
- 5 × 7 array with X-Y select and decimal point.
- Compatible with usascll and ebcdic codes.
- Categorized for luminous intensity
- Easy mounting on P.C. board or sockets.

Description

The LTP-305 series are 0.3 inch (7.62mm) matrix height 5 × 7 dot matrix displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red displays have red package. Green displays have green package. High efficiency red displays have red package.

Package Dimensions



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.010") unless otherwise noted.

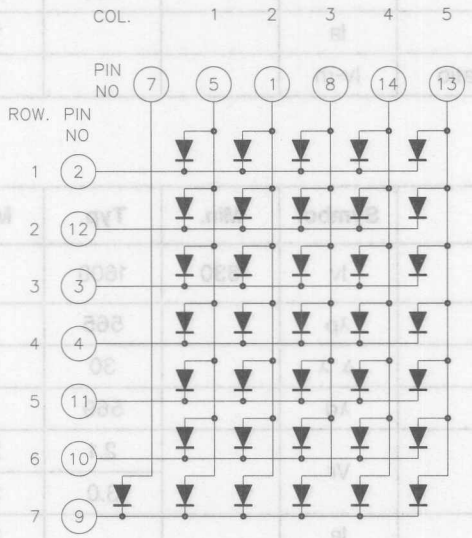
Devices

Part No.			Description
Red	Green	Hi.-Eff. Red	
LTP-305R	LTP-305G	LTP-305HR	Anode Column, Cathode Row; Lt. Hand Decimal

Pin Connection

Pin No.	Connection	Pin No.	Connection
1	Anode Column 2	8	Anode Column 3
2	Cathode Row 1	9	Cathode Row 7
3	Cathode Row 3	10	Cathode Row 6
4	Cathode Row 4	11	Cathode Row 5
5	Anode Column 1	12	Cathode Row 2
6	No Pin	13	Anode Column 5
7	Anode Decimal (Point)	14	Anode Column 4

Internal Circuit Diagram



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Green	Hl.-Eff. Red	Unit
Average Power Dissipation Per Dot	26	26	26	mW
Peak Forward Current Per Dot	110	75	75	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	14 0.19	10 0.14	10 0.14	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

LTP-305R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	220	400		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λd		651		nm	IF=20mA
Forward Voltage, any Dot	VF		1.7	2.0	V	IF=20mA
			1.85	2.15	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-305G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	630	1600		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-305HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	630	1600		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

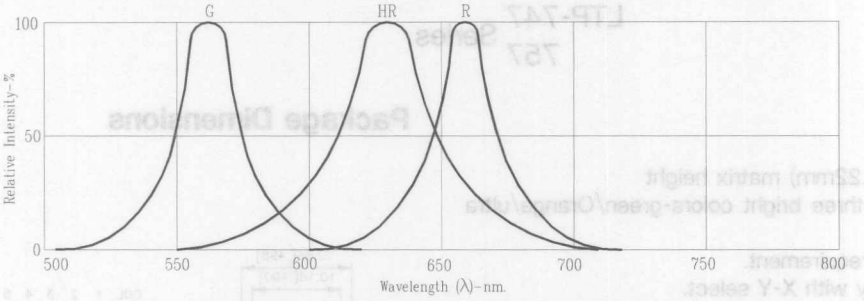


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

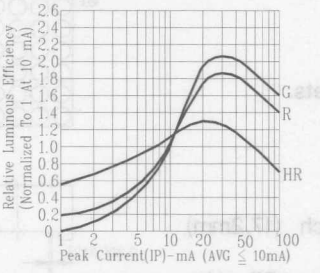


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VSPEAK CURRENT

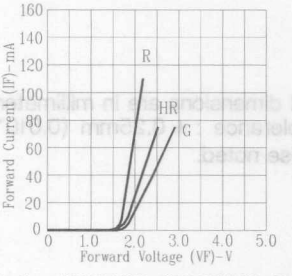


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

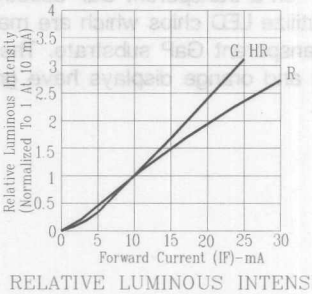


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

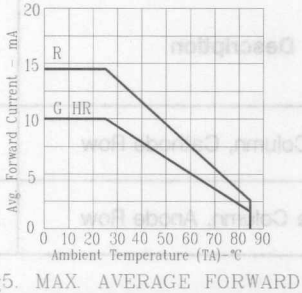


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

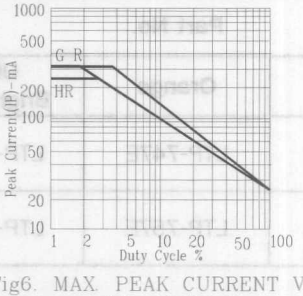


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN R=RED HR=HI-EFF.RED (REFRESH RATE 1KHz)

LITEON

2φ 5 × 7 Single Color Dot Matrix LED Displays

LTP-747
757 Series

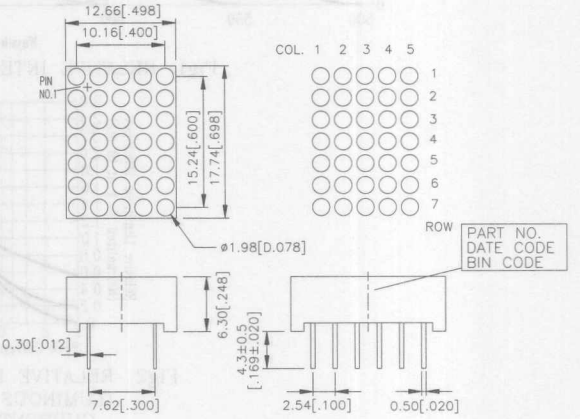
Features

- 0.7 inch (17.22mm) matrix height
- Choices of three bright colors-green/Orange/ultra bright red.
- Low power requirement.
- 5 × 7 appay with X-Y select.
- Compatible with usascll and ebcdic codes.
- Stackable vertically and horizontally.
- Choices of two matrix orientation. Cathode row, or cathode column.
- Easy mounting on P.C. board or sockets.
- Categorized for luminous intensity.

Description

The LTP-747/757 series are 0.7 inch (17.2mm) matrix height 5 × 7 dot matrix displays.
The ultra bright red series devices utilize LED chip-swhich are made from AlGaAs on a GaAs substrate. The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange series utilize LED chips which are made from GaAsP on a transparent GaP substrate. The green , ultra bright red and orange displays have gray face and white dots.

Package Dimensions



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.010") unless otherwise noted.

Devices

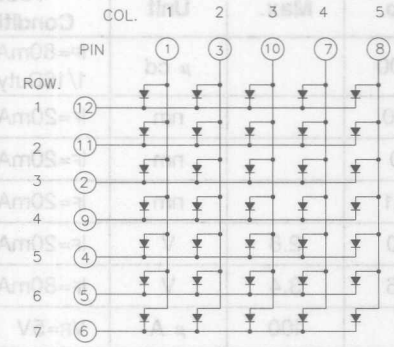
Part No.			Description	Internal Circuit Diagram
Green	Orange	Ultra Bright Red		
LTP-747G	LTP-747E	LTP-747C	Anode Column, Cathode Row	A
LTP-757G	LTP-757E	LTP-757C	Cathode Column, Anode Row	B

Pin Connection

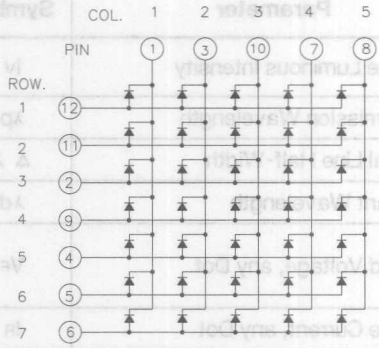
Pin No.	Connection	
	LTP-747	LTP-757
1	Anode Column 1	Cathode Column 1
2	Cathode Row 3	Anode Row 3
3	Anode Column 2	Cathode Column 2
4	Cathode Row 5	Anode Row 5
5	Cathode Row 6	Anode Row 6
6	Cathode Row 7	Anode Row 7
7	Anode Column 4	Cathode Column 4
8	Anode Column 5	Cathode Column 5
9	Cathode Row 4	Anode Row 4
10	Anode Column 3	Cathode Column 3
11	Cathode Row 2	Anode Row 2
12	Cathode Row 1	Anode Row 1

Internal Circuit Diagrams

A. LTP-747



B. LTP-757



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	32	32	32	mW
Peak Forward Current Per Dot	90	90	110	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	11 0.15	11 0.15	14 0.19	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

LTP-747G/757G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	630	2000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-747E/757E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	630	2000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-747C/757C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	5000	9000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		1.8	2.4	V	IF=20mA
			2.0	2.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperatrue Unless Otherwise Noted)

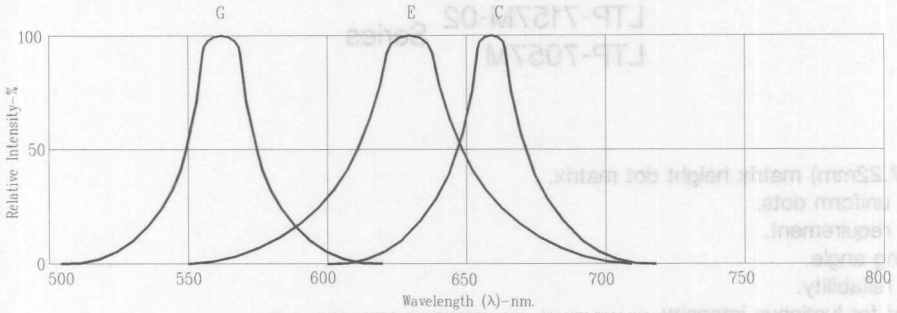


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

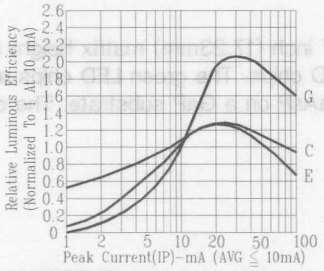


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

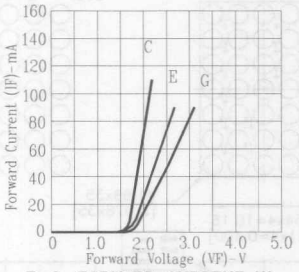


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

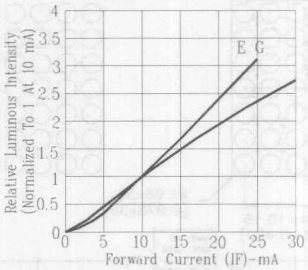


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

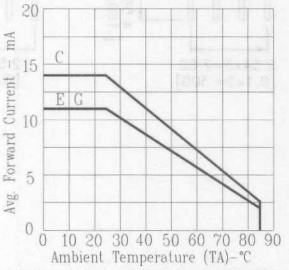


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

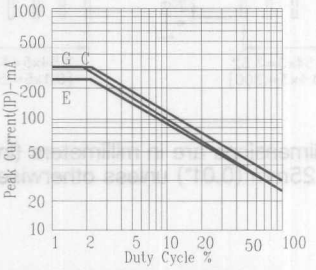


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

LITEON

2 ϕ 5 × 7 Multicolor Dot Matrix LED Displays

LTP-7157M-02
LTP-7057M Series

Features

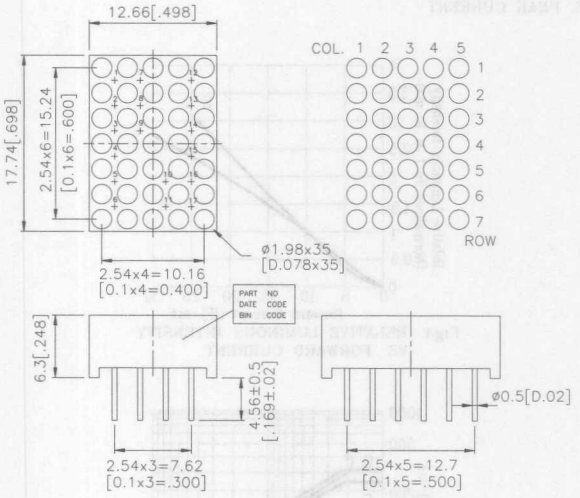
- 0.7 inch (17.22mm) matrix height dot matrix.
- Continuous uniform dots.
- Low power requirement.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.

Description

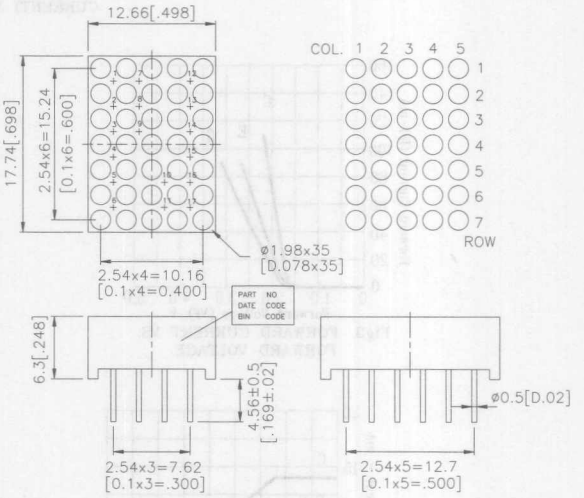
The LTP-7157M-02 , LTP-7057M are 0.7 inch (17.23mm) matrix height 5x7 dot matrix displays.
The device utilizes green and orange LED chips. The green LED chips are made from GaP on a GaP substrate, The orange LED chips are made from GaAsP on a GaP substrate. The devices have gray face and white dots.

Package Dimensions

LTP-7157M-02



LTP-7057M



Notes : All dimensions are in millimeters (inches). Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

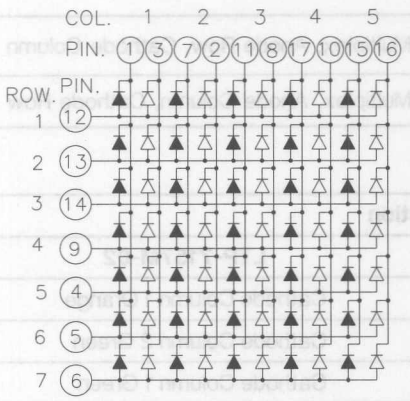
Part No.	Description
Green & Orange	
LTP-7157M-02	Multiplex, Anode Row, Cathode Column
LTP-7057M	Multiplex, Anode Column, Cathode Row

Pin Connection

Pin No.	Connection	
	LTP-7057M	LTP-7157M-02
1	Anode Column 1 Orange	Cathode Column 1 Orange
2	Anode Column 2 Green	Cathode Column 2 Green
3	Anode Column 1 Green	Cathode Column 1 Green
4	Cathode Row 5	Anode Row 5
5	Cathode Row 6	Anode Row 6
6	Cathode Row 7	Anode Row 7
7	Anode Column 2 Orange	Cathode Column 2 Orange
8	Anode Column 3 Green	Cathode Column 3 Green
9	Cathode Row 4	Anode Row 4
10	Anode Column 4 Green	Cathode Column 4 Green
11	Anode Column 3 Orange	Cathode Column 3 Orange
12	Cathode Row 1	Anode Row 1
13	Cathode Row 2	Anode Row 2
14	Cathode Row 3	Anode Row 3
15	Anode Column 5 Orange	Cathode Column 5 Orange
16	Anode Column 5 Green	Cathode Column 5 Green
17	Anode Column 4 Orange	Cathode Column 4 Orange

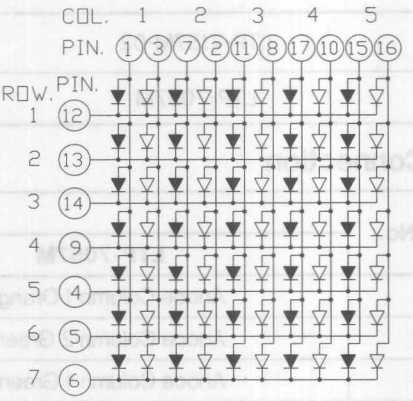
Internal Circuit Diagrams

LTP-7157M-02



NOTES: THE " ▽ " STANDS FOR GREEN CHIPS.
THE " ▼ " STANDS FOR ORANGE CHIPS.

LTP-7057M



NOTES: THE " ▽ " STANDS FOR GREEN CHIPS.
THE " ▼ " STANDS FOR ORANGE CHIPS.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Unit
Average Power Dissipation Per Dot	36	36	mW
Peak Forward Current Per Dot	100	100	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	13 0.17	13 0.17	mA mA/ ℃
Reverse Voltage Per Dot	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃		
Storage Temperature Range	-35 ℃ to +85 ℃		
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃			

Electrical/Optical Characteristics at Ta=25 ℃
Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2300		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Orange

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2300		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

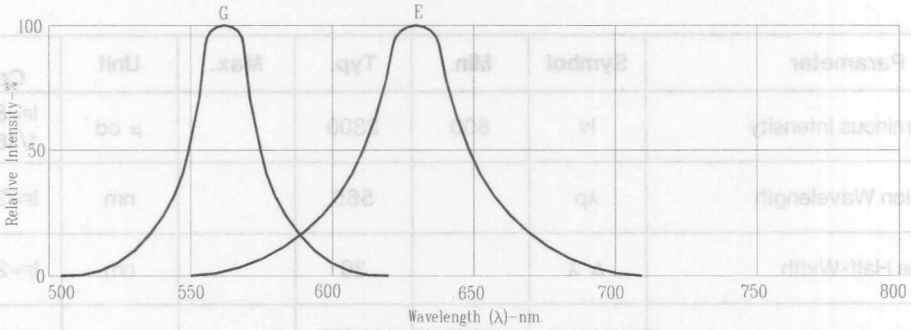


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

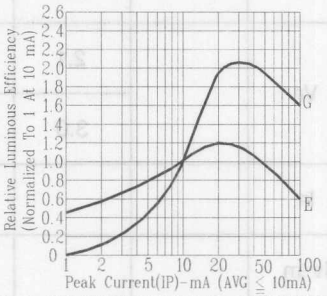


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

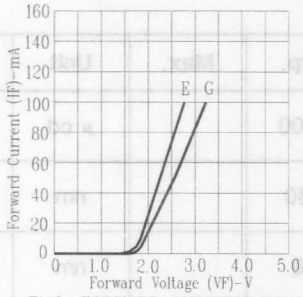


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

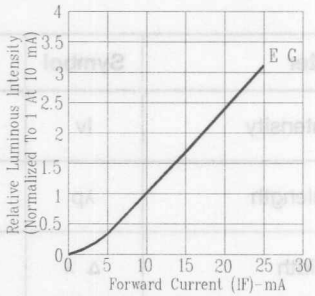


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

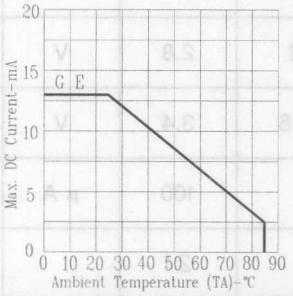


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

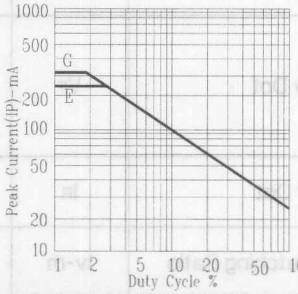


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE (REFRESH RATE 1KHz)

LITEON

3 ϕ 5 × 7 Single Color & Multicolor Dot Matrix LED Displays

LTP-1257AA/1357AA
1457A/1557A Series

Features

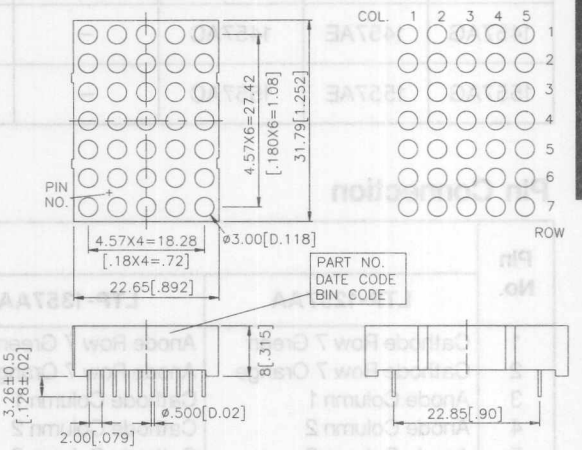
- 1.2 inch (30.42mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- Solid state reliability.
- 5 × 7array with X-Y select
- Compatible with usascll and ebcdic codes.
- Stackable horizontally.
- Choices of two matrix orientation cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and yellow (green and orange mixed).

Description

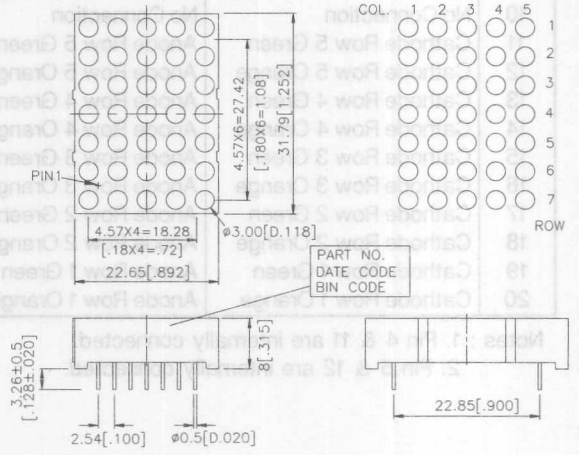
The LTP-1X57A series are 1.2 inch (30.42mm)matrix height 5 × 7 dot matrix displays.
The LTP-1257AA/1357AA are multicolor applicable displays. The multicolor displays have gray face and white dots.
The LTP-1457A/1557A series are single color displays. The green, ultra bright red and orange displays have gray face and white dots.
The green series devices are made from GaP on a utilize LED chips which transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-1257AA/1357AA



B. LTP-1457A/1557A



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
–	–	–	1257AA	Anode Column, Cathode Row	A	A
–	–	–	1357AA	Cathode Column, Anode Row	A	B
1457AG	1457AE	1457AC	–	Anode Column, Cathode Row	B	C
1557AG	1557AE	1557AC	–	Cathode Column, Anode Row	B	D

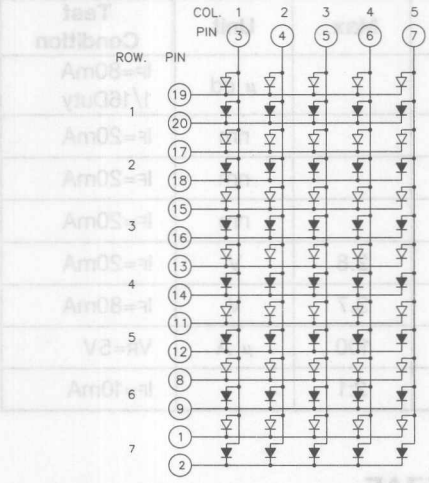
Pin Connection

Pin No.	Connection			
	LTP-1257AA	LTP-1357AA	LTP-1457A	LTP-1557A
1	Cathode Row 7 Green	Anode Row 7 Green	Cathode Row 5	Anode Row 5
2	Cathode Row 7 Orange	Anode Row 7 Orange	Cathode Row 7	Anode Row 7
3	Anode Column 1	Cathode Column 1	Anode Column 2	Cathode Column 2
4	Anode Column 2	Cathode Column 2	Anode Column 3*1	Cathode Column 3*1
5	Anode Column 3	Cathode Column 3	Cathode Row 4*2	Anode Row 4*2
6	Anode Column 4	Cathode Column 4	Anode Column 5	Cathode Column 5
7	Anode Column 5	Cathode Column 5	Cathode Row 6	Anode Row 6
8	Cathode Row 6 Green	Anode Row 6 Green	Cathode Row 3	Anode Row 3
9	Cathode Row 6 Orange	Anode Row 6 Orange	Cathode Row 1	Anode Row 1
10	No Connection	No Connection	Anode Column 4	Cathode Column 4
11	Cathode Row 5 Green	Anode Row 5 Green	Anode Column 3*1	Cathode Column 3*1
12	Cathode Row 5 Orange	Anode Row 5 Orange	Cathode Row 4*2	Anode Row 4*2
13	Cathode Row 4 Green	Anode Row 4 Green	Anode Column 1	Cathode Column 1
14	Cathode Row 4 Orange	Anode Row 4 Orange	Cathode Row 2	Anode Row 2
15	Cathode Row 3 Green	Anode Row 3 Green		
16	Cathode Row 3 Orange	Anode Row 3 Orange		
17	Cathode Row 2 Green	Anode Row 2 Green		
18	Cathode Row 2 Orange	Anode Row 2 Orange		
19	Cathode Row 1 Green	Anode Row 1 Green		
20	Cathode Row 1 Orange	Anode Row 1 Orange		

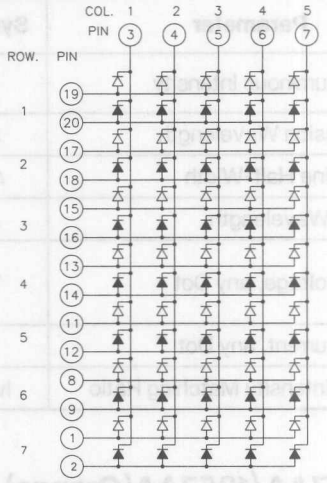
Notes : 1. Pin 4 & 11 are internally connected.
2. Pin 5 & 12 are internally connected.

Internal Circuit Diagrams

A. LTP-1257AA

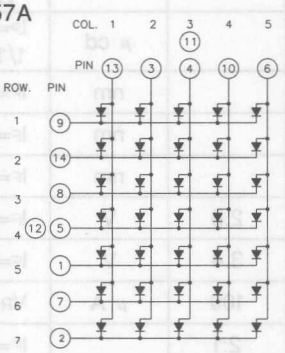


B. LTP-1357AA

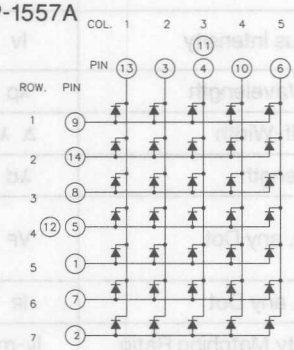


NOTE:The sign" ⊳| "stands for Orange color chips
The sign" ⊳| "stands for Green color chips

C. LTP-1457A



D. LTP-1557A



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	36	36	36	mW
Peak Forward Current Per Dot	100	100	125	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	13 0.17	13 0.17	15 0.20	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

LTP-1257AA/1357AA(Green) & LTP-1457AG/1557AG

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-1257AA/1357AA(Orange) & LTP-1457AE/1557AE

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-1457AC/1557AC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	5400	12000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		1.8	2.4	V	IF=20mA
			2.0	2.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperatrue Unless Otherwise Noted)

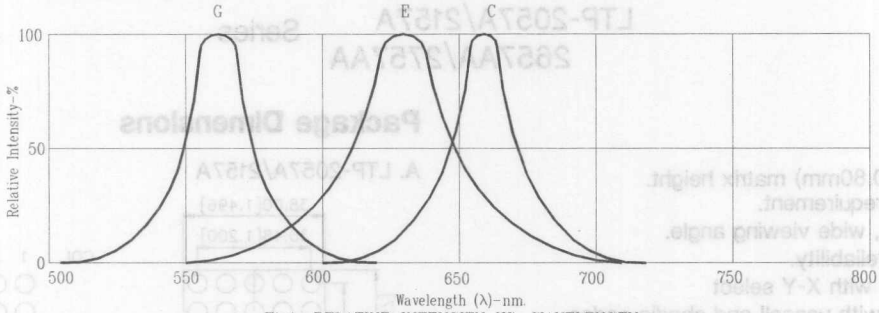


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

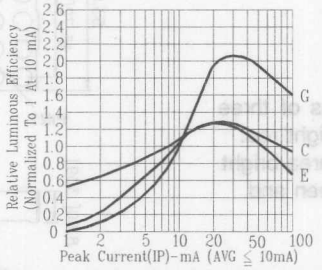


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

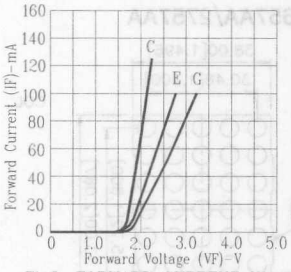


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

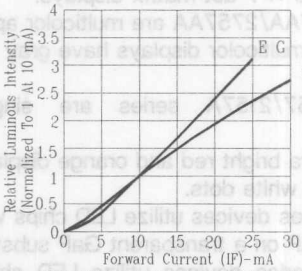


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

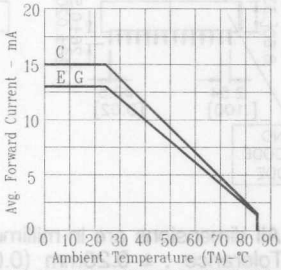


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

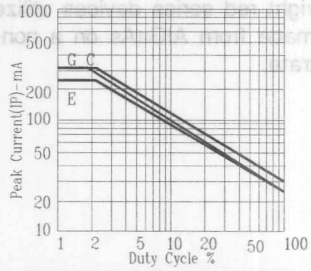


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

LITEON

5 ϕ 5 × 7 Single Color & Multicolor Dot Matrix LED Displays

LTP-2057A/2157A Series
2657AA/2757AA

Features

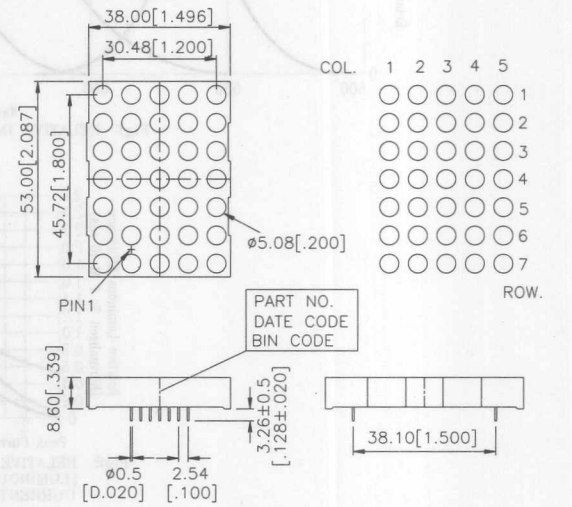
- 2.0 inch (50.80mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- Solid state reliability.
- 5 × 7 array with X-Y select
- Compatible with usascll and ebcdic codes.
- Stackable horizontally.
- Choices of two matrix orientation Cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and yellow (green and orange mixed)

Description

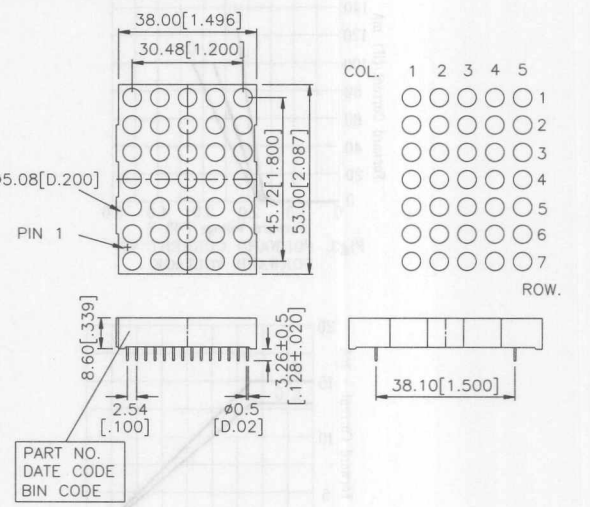
The LTP-2X57A series are 2.0 inch (50.80mm) matrix height 5 × 7 dot matrix displays.
The LTP-2657AA/2757AA are multicolor applicable displays. The multicolor displays have gray face and white dots.
The LTP-2057/2157A series are single color displays.
The green, ultra bright red and orange displays have gray face and white dots.
The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-2057A/2157A



B. LTP-2657AA/2757AA



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
2057AG	2057AE	2057AC	–	Anode Column, Cathode Row	A	A
2157AG	2157AE	2757AC	–	Cathode Column, Anode Row	A	B
–	–	–	2657AA	Anode Column, Cathode Row	B	C
–	–	–	2757AA	Cathode Column, Anode Row	B	D

Pin Connection

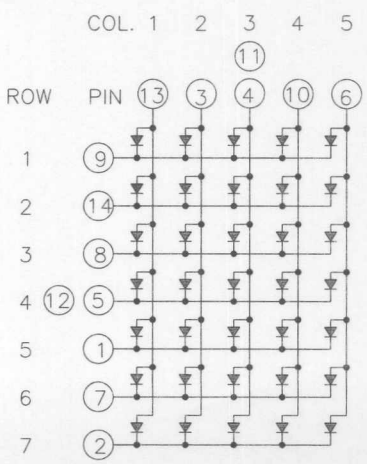
Pin No.	Connection	
	A. LTP-2057A	B. LTP-2157A
1	Cathode Row 5	Anode Row 5
2	Cathode Row 7	Anode Row 7
3	Anode Column 2	Cathode Column 2
4	Anode Column 3*1	Cathode Column 3*1
5	Cathode Row 4*2	Anode Row 4*2
6	Anode Column 5	Cathode Column 5
7	Cathode Row 6	Anode Row 6
8	Cathode Row 3	Anode Row 3
9	Cathode Row 1	Anode Row 1
10	Anode Column 4	Cathode Column 4
11	Anode Column 3*1	Cathode Column 3*1
12	Cathode Row 4*2	Anode Row 4*2
13	Anode Column 1	Cathode Column 1
14	Cathode Row 2	Anode Row 2

Notes : 1. Pin 4 & 11 are internally connected.
2. Pin 5 & 12 are internally connected.

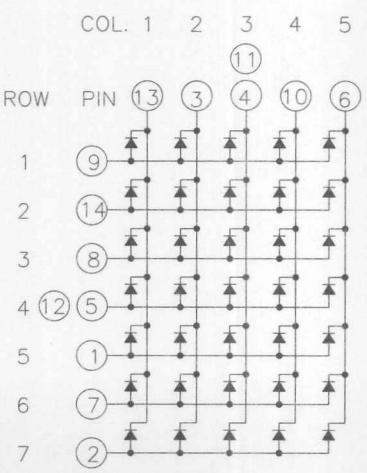
Pin No.	Connection	
	C. LTP-2657AA	D. LTP-2757AA
1	Anode Column 1 Green	Cathode Column 1 Green
2	Anode Column 1 Orange	Cathode Column 1 Orange
3	Cathode Row 7 Green	Anode Row 7 Green
4	Cathode Row 7 Orange	Anode Row 7 Orange
5	Anode Column 2 Green	Cathode Column 2 Green
6	Anode Column 2 Orange	Cathode Column 2 Orange
7	Anode Column 3 Green	Cathode Column 3 Green
8	Anode Column 3 Orange	Cathode Column 3 orange
9	Cathode Row 5 Green	Anode Row 5 Green
10	Cathode Row 5 Orange	Anode Row 5 Orange
11	Cathode Row 4 Green	Anode Row 4 Green
12	Cathode Row 4 Orange	Anode Row 4 Orange
13	Cathode Row 6 Green	Anode Row 6 Green
14	Cathode Row 6 Orange	Anode Row 6 Orange
15	Anode Column 5 Green	Cathode Column 5 Green
16	Anode Column 5 Orange	Cathode Column 5 Orange
17	Cathode Row 1 Green	Anode Row 1 Green
18	Cathode Row 1 Orange	Anode Row 1 Orange
19	Anode Column 4 Green	Cathode Column 4 Green
20	Anode Column 4 Orange	Cathode Column 4 Orange
21	Anode Column 3 Green	Cathode Column 3 Green
22	Anode Column 3 Orange	Cathode Column 3 Orange
23	Cathode Row 3 Green	Anode Row 3 Green
24	Cathode Row 3 Orange	Anode Row 3 Orange
25	Cathode Row 4 Green	Anode Row 4 Green
26	Cathode Row 4 Orange	Anode Row 4 Orange
27	Cathode Row 2 Green	Anode Row 2 Green
28	Cathode Row 2 Orange	Anode Row 2 Orange

Internal Circuit Diagrams

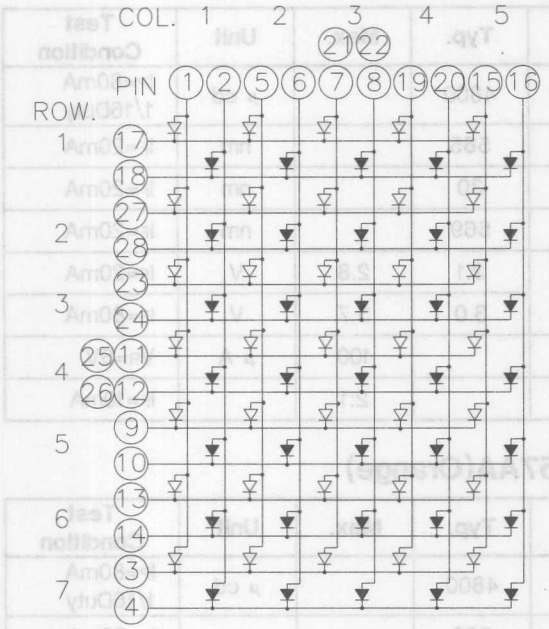
A. LTP-2057A



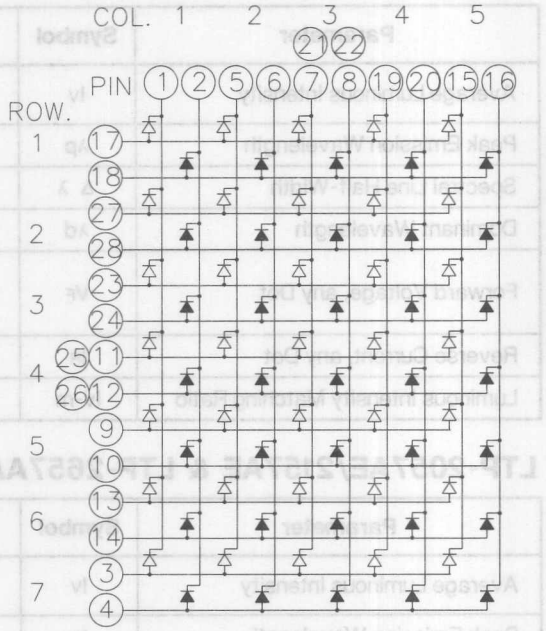
B. LTP-2157A



C. LTP-2657AA



B. LTP-2757AA



Notes : The Sign " ⊣▷⊢ " stands for Green color chips.
The Sign " ⊣▶⊢ " stands for Orange color chips.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	36	36	36	mW
Peak Forward Current Per Dot	100	100	125	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	13 0.17	13 0.17	15 0.20	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃
LTP-2057AG/2157AG & LTP-2657AA/2757AA(Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2057AE/2157AE & LTP-2657AA/2757AA(Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2057AC/2157AC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	6300	12000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		1.8	2.4	V	IF=20mA
			2.0	2.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperatrue Unless Otherwise Noted)

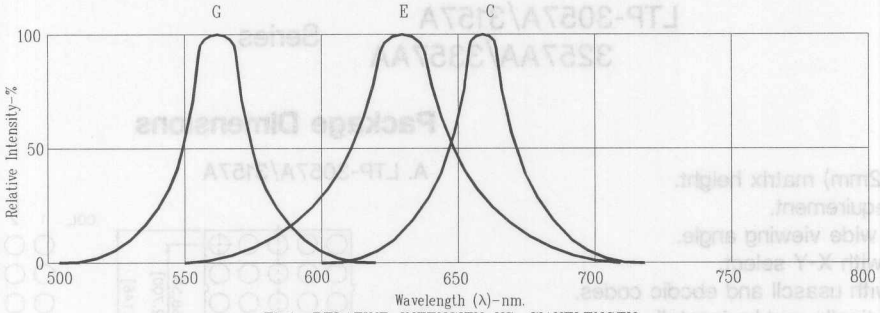


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

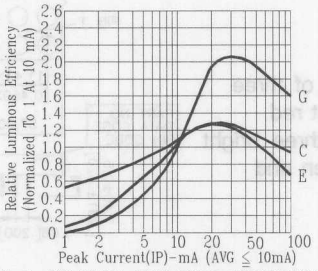


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

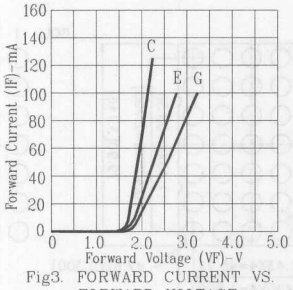


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

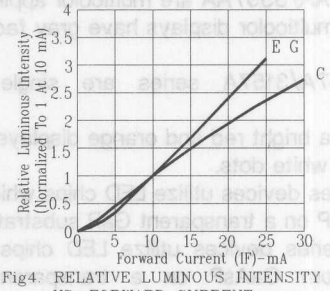


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

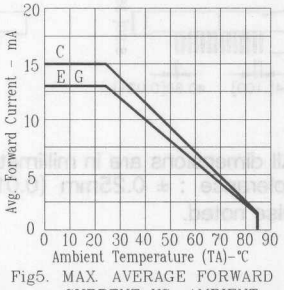


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

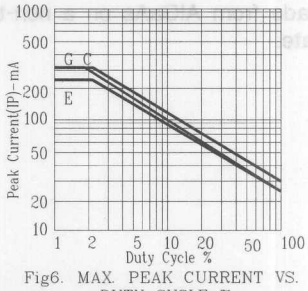


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

LITEON

7.62 ϕ 5 × 7 Single Color & Multicolor Dot Matrix LED Displays

LTP-3057A/3157A
3257AA/3357AA Series

Features

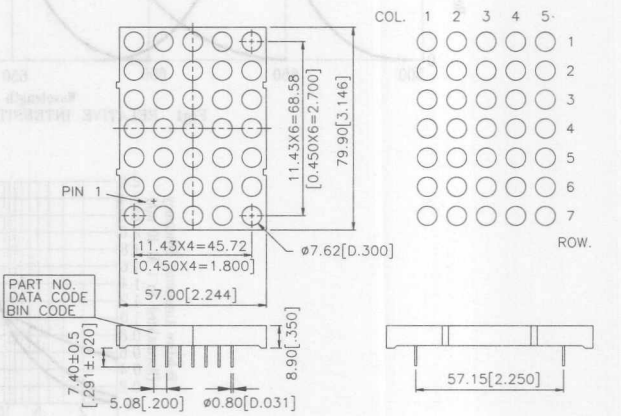
- 3.0 inch (76.2mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- 5 × 7 array with X-Y select.
- Compatible with usascll and ebcdic codes.
- Stackable vertically and horizontally.
- Choices of two matrix orientation. Cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and yellow (green and orange mixed)

Description

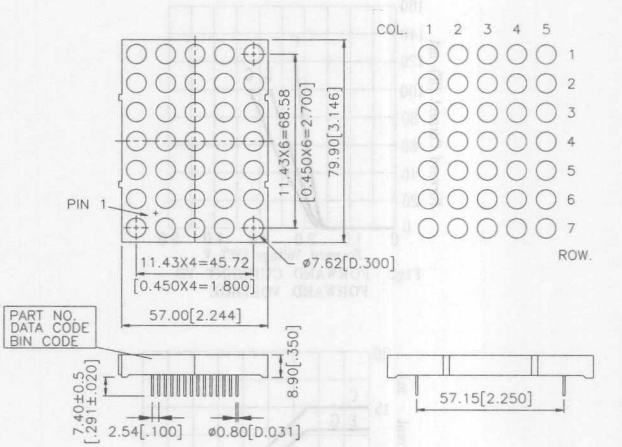
The LTP-3X57A series are 3.0 inch (76.2mm)matrix height 5 × 7 dot matrix displays.
The LTP-3257AA/3357AA are multicolor applicable displays. The multicolor displays have gray face and white dots.
The LTP-3057A/3157A series are single color displays.
The green, ultra bright red and orange displays have gray face and white dots.
The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-3057A/3157A



B. LTP-3257AA/3357AA



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
3057AG	3057AE	3057AC	–	Anode Column, Cathode Row	A	A
3157AG	3157AE	3157AC	–	Cathode Column, Anode Row	A	B
–	–	–	3257AA	Anode Column, Cathode Row	B	C
–	–	–	3357AA	Cathode Column, Anode Row	B	D

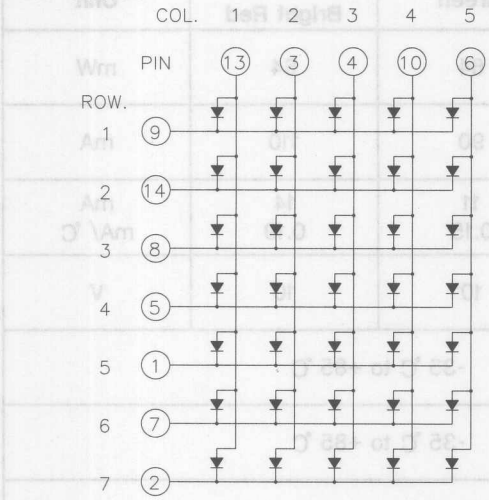
Pin Connection

Pin No.	Connection	
	LTP-3157A	LTP-3057A
1	Anode Row 5	Cathode Row 5
2	Anode Row 7	Cathode Row 7
3	Cathode Column 2	Anode Column 2
4	Cathode Column 3	Anode Column 3
5	Anode Row 4	Cathode Row 4
6	Cathode Column 5	Anode Column 5
7	Anode Row 6	Cathode Row 6
8	Anode Row 3	Cathode Row 3
9	Anode Row 1	Cathode Row 1
10	Cathode Column 4	Anode Column 4
11	No Connection	No Connection
12	No Connection	No Connection
13	Cathode Column 1	Anode Column 1
14	Anode Row 2	Cathode Row 2

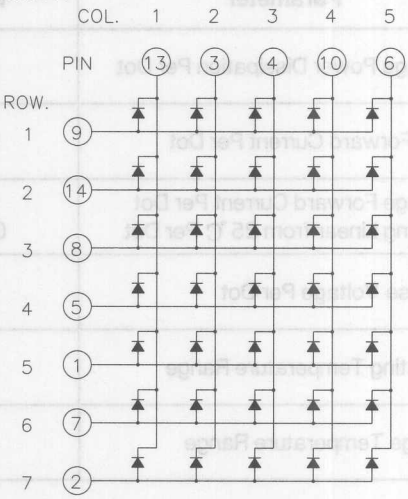
Pin No.	Connection	
	LTP-3257A	LTP-3357A
1	Anode Column 1 Green	Cathode Column 1 Green
2	Anode Column 1 Orange	Cathode Column 1 Orange
3	Cathode Row 7 Green	Anode Row 7 Green
4	Cathode Row 7 Orange	Anode Row 7 Orange
5	Anode Column 2 Green	Cathode Column 2 Green
6	Anode Column 2 Orange	Cathode Column 2 Orange
7	Anode Column 3 Green	Cathode Column 3 Green
8	Anode Column 3 Orange	Cathode Column 3 Orange
9	Cathode Row 5 Green	Anode Row 5 Green
10	Cathode Row 5 Orange	Anode Row 5 Orange
11	Cathode Row 4 Green	Anode Row 4 Green
12	Cathode Row 4 Orange	Anode Row 4 Orange
13	Cathode Row 6 Green	Anode Row 6 Green
14	Cathode Row 6 Orange	Anode Row 6 Orange
15	Anode Column 5 Green	Cathode Column 5 Green
16	Anode Column 5 Orange	Cathode Column 5 Orange
17	Cathode Row 1 Green	Anode Row 1 Green
18	Cathode Row 1 Orange	Anode Row 1 Orange
19	Anode Column 4 Green	Cathode Column 4 Green
20	Anode Column 4 Orange	Cathode Column 4 Orange
21	Anode Column 3 Green	Cathode Column 3 Green
22	Anode Column 3 Orange	Cathode Column 3 Orange
23	Cathode Row 3 Green	Anode Row 3 Green
24	Cathode Row 3 Orange	Anode Row 3 Orange
25	Cathode Row 4 Green	Anode Row 4 Green
26	Cathode Row 4 Orange	Anode Row 4 Orange
27	Cathode Row 2 Green	Anode Row 2 Green
28	Cathode Row 2 Orange	Anode Row 2 Orange

Internal Circuit Diagrams

A. LTP-3057A

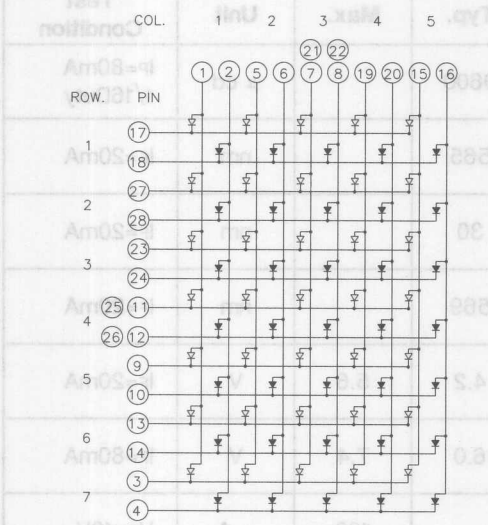


B. LTP-3157A

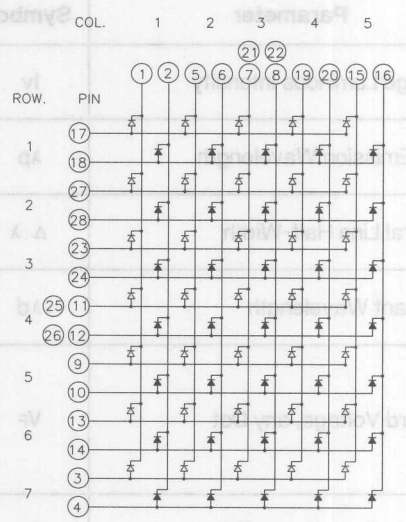


Notes : The Sign " ▶| " stands for two chips in series.

C. LTP-3257A



D. LTP-3357A



Notes : The Sign " ▶| " stands for Orange color chips. (Two Chips In Series).
The Sign " ▷| " stands for Green color chips. (Two Chips In Series)

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Green	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	64	64	64	mW
Peak Forward Current Per Dot	90	90	110	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	11 0.15	11 0.15	14 0.19	mA mA/ ℃
Reverse Voltage Per Dot	10	10	10	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃
LTP-3057AG/3157AG & LTP-3257AA/3357AA (Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	3000	9600		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		4.2	5.6	V	IF=20mA
			6.0	7.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-3057AE/3157AE & LTP-3257AA/3357AA (Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	3000	9600		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		4	5.6	V	IF=20mA
			5.2	6.8	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-3057AC/3157AC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	11500	20000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		3.6	4.8	V	IF=20mA
			4	5.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperatrue Unless Otherwise Noted)

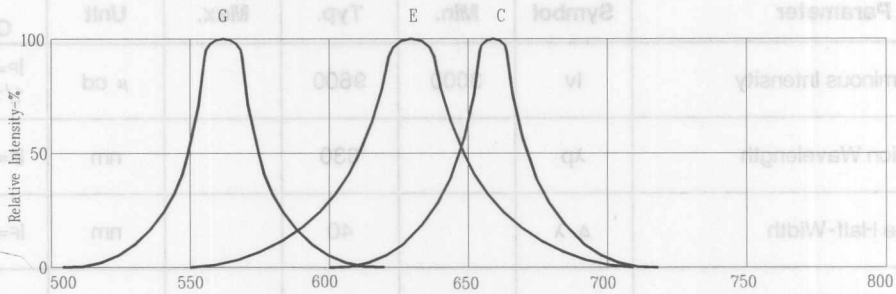


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

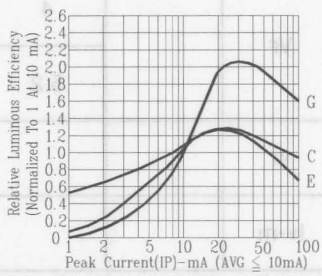


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

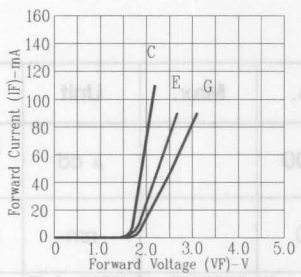


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

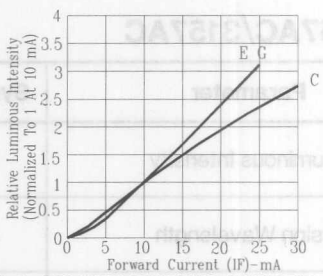


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

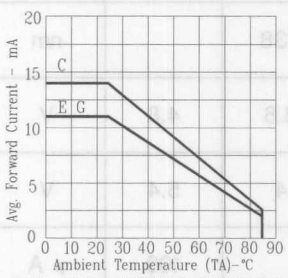


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

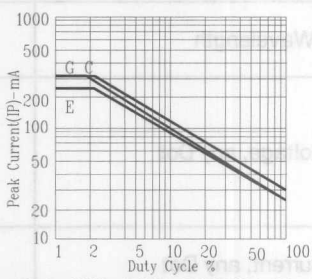


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

LITEON

10.16 ϕ 5 × 7 Single Color & Multicolor Dot Matrix LED Displays

LTP-4057A/4157A
4257AA/4357AA Series

Features

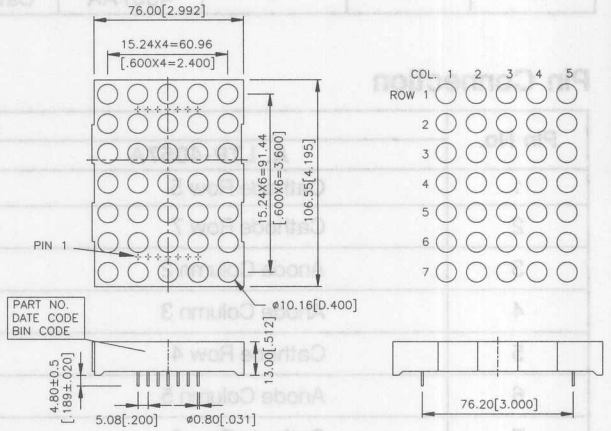
- 4.0 inch (101.6mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- 5 × 7 array with X-Y select.
- Compatible with usascll and ebcdic codes.
- Stackable vertically and horizontally.
- Choices of Two matrix orientation. Cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and Yellow (green and orange mixed)

Description

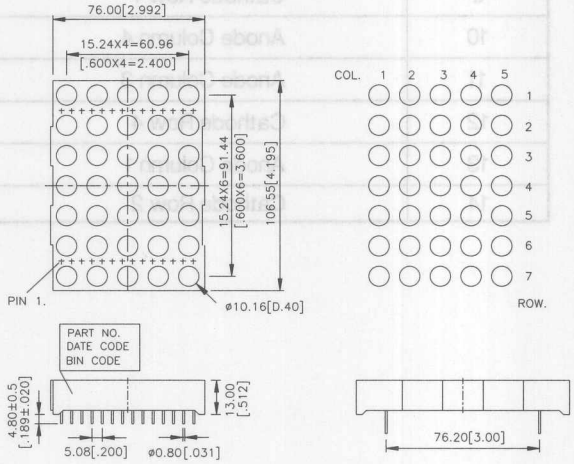
The LTP-4X57A series are 2.0 inch (50.80mm) matrix height 5 × 7 dot matrix displays.
The LTP-4257AA/4357AA are multicolor applicable displays. The multicolor displays have gray face and white dots.
The LTP-4057A/4157A series are single color displays.
The green, orange displays have gray face and white dot color. The ultra bright red devices have red face and white dots.
The green series devices utilize LED chipse which are made from GaP on a transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright Red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-4057A/4157A



B. LTP-4257AA/4357AA



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
4057AG	4057AE	4057AC	–	Anode Column, Cathode Row	A	A
4157AG	4157AE	4157AC	–	Cathode Column, Anode Row	A	B
–	–	–	4257AA	Anode Column, Cathode Row	B	C
–	–	–	4357AA	Cathode Column, Anode Row	B	D

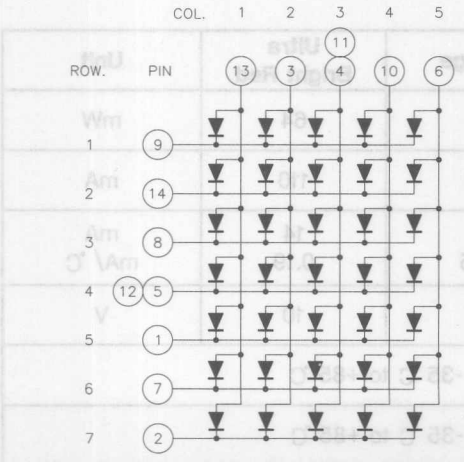
Pin Connection

Pin No.	Connection	
	A. LTP-4057A	B. LTP-4157A
1	Cathode Row 5	Anode Row 5
2	Cathode Row 7	Anode Row 7
3	Anode Column 2	Cathode Column 2
4	Anode Column 3	Cathode Column 3
5	Cathode Row 4	Anode Row 4
6	Anode Column 5	Cathode Column 5
7	Cathode Row 6	Anode Row 6
8	Cathode Row 3	Anode Row 3
9	Cathode Row 1	Anode Row 1
10	Anode Column 4	Cathode Column 4
11	Anode Column 3	Cathode Column 3
12	Cathode Row 4	Anode Row 4
13	Anode Column 1	Cathode Column 1
14	Cathode Row 2	Anode Row 2

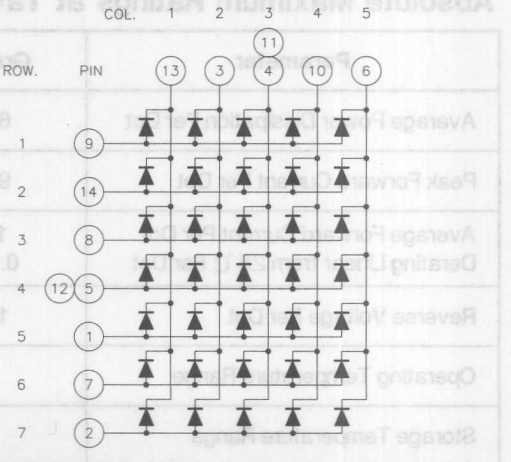
Pin No.	Connection	
	C. LTP-4257AA	D. LTP-4357AA
1	Anode Column 1 Green	Cathode Column 1 Green
2	Anode Column 1 Orange	Cathode Column 1 Orange
3	Cathode Row 7 Green	Anode Row 7 Green
4	Cathode Row 7 Orange	Anode Row 7 Orange
5	Anode Column 2 Green	Cathode Column 2 Green
6	Anode Column 2 Orange	Cathode Column 2 Orange
7	Anode Column 3 Green	Cathode Column 3 Green
8	Anode Column 3 Orange	Cathode Column 3 Orange
9	Cathode Row 5 Green	Anode Row 5 Green
10	Cathode Row 5 Orange	Anode Row 5 Orange
11	Cathode Row 4 Green	Anode Row 4 Green
12	Cathode Row 4 Orange	Anode Row 4 Orange
13	Cathode Row 6 Green	Anode Row 6 Green
14	Cathode Row 6 Orange	Anode Row 6 Orange
15	Anode Column 5 Green	Cathode Column 5 Green
16	Anode Column 5 Orange	Cathode Column 5 Orange
17	Cathode Row 1 Green	Anode Row 1 Green
18	Cathode Row 1 Orange	Anode Row 1 Orange
19	Anode Column 4 Green	Cathode Column 4 Green
20	Anode Column 4 Orange	Cathode Column 4 Orange
21	Anode Column 3 Green	Cathode Column 3 Green
22	Anode Column 3 Orange	Cathode Column 3 Orange
23	Cathode Row 3 Green	Anode Row 3 Green
24	Cathode Row 3 Orange	Anode Row 3 Orange
25	Cathode Row 4 Green	Anode Row 4 Green
26	Cathode Row 4 Orange	Anode Row 4 Orange
27	Cathode Row 2 Green	Anode Row 2 Green
28	Cathode Row 2 Orange	Anode Row 2 Orange

Internal Circuit Diagrams

A. LTP-4057A

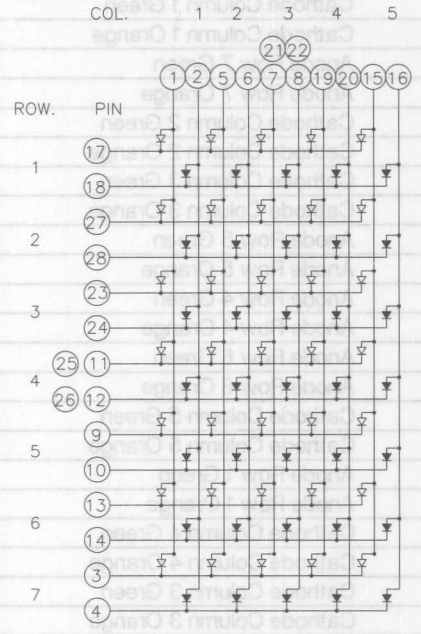


B. LTP-4157A

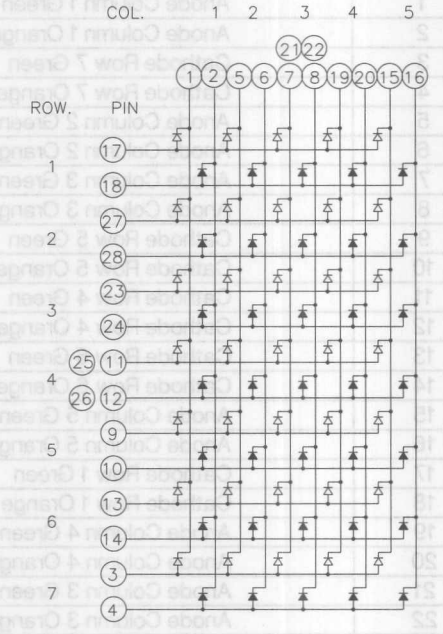


Note : The Sign " ⊣▶⊢ " Stands For 2 Chips in Series.

C. LTP-4257AA



D. LTP-4357AA



Notes : The Sign " ▶| " stands for Orange color 2 chips sceries.
The Sign " |▷ " stands for Green color 2 chips sceries.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	64	64	64	mW
Peak Forward Current Per Dot	90	90	110	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	11 0.15	11 0.15	14 0.19	mA mA/ ℃
Reverse Voltage Per Dot	10	10	10	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃
LTP-4057AG/4157AG & LTP-4257AA/4357AA (Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	3000	9600		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		4.2	5.6	V	IF=20mA
			6	7.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-4057AE/4157AE & LTP-4257AA/4357AA (Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	3000	9600		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		4	5.6	V	IF=20mA
			5.2	6.8	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-4057AC/4157AC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	11600	20000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		3.6	4.8	V	IF=20mA
			4	5.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

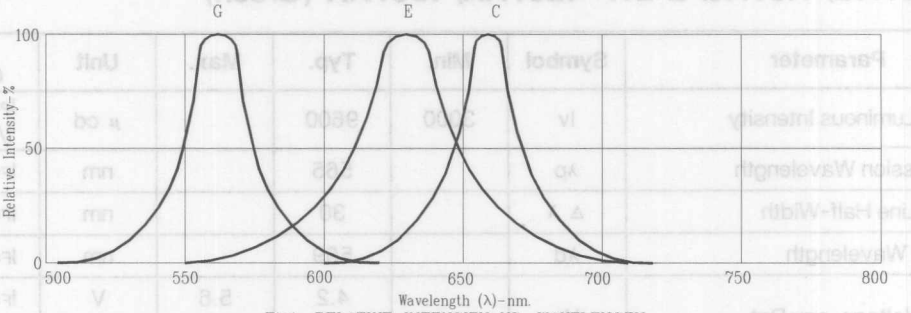


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

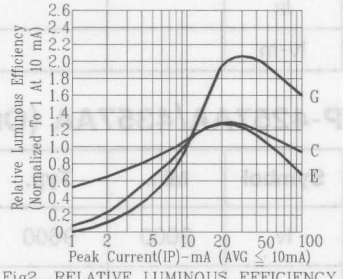


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

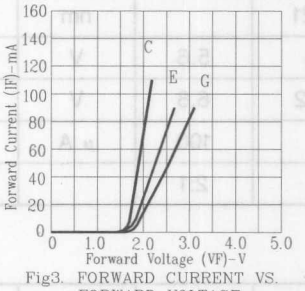


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

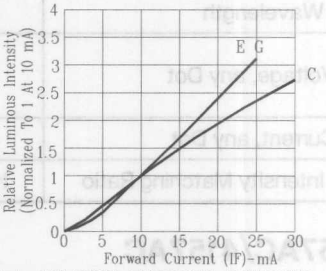


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

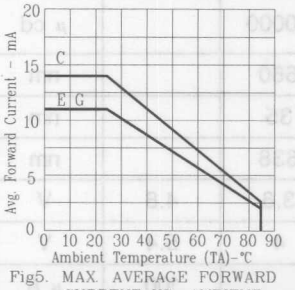


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

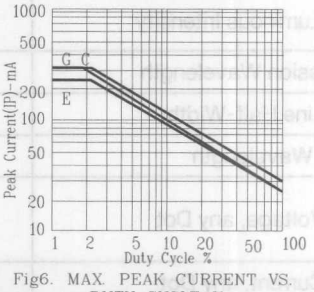


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

LITEON

3 ϕ 5 × 8 Single Color & Multi-color Dot Matrix LED Displays

LTP-14058A/14158A
14858AA/14958AA Series

Features

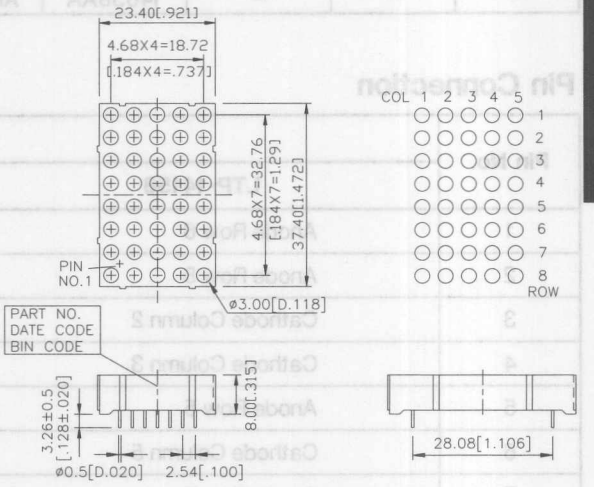
- 1.4 inch (35.76mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- Solid state reliability.
- 5 × 8 array with X-Y select
- Compatible with usascll and ebcdic codes.
- Stackable horizontally.
- Choices of two matrix orientation
  Cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have The choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and Yellow (green and orange mixed)

Description

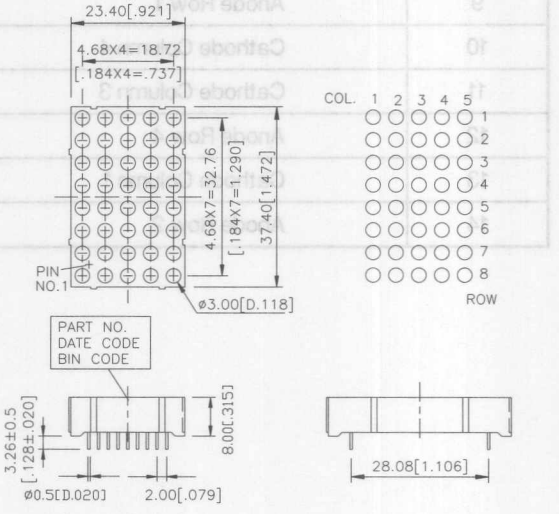
The LTP-14X58A series are 1.4 inch (35.76mm) matrix height 5X8 dot matrix displays.
The LTP-14858AA/14958AA are multicolor applicable displays. The multicolor displays have gray face and white dots.
The LTP-14058A/14158A series are single color displays.
The green, ultra bright red and orange displays have gray face and white dots.
The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-14058A/14158A



B. LTP-14858AA/14958AA



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
14158AG	14158AE	14158AC	–	Cathode Column, Anode Row	A	A
14058AG	14058AE	14058AC	–	Anode Column, Cathode Row	A	B
–	–	–	14958AA	Cathode Column, Anode Row	B	C
–	–	–	14858AA	Anode Column, Cathode Row	B	D

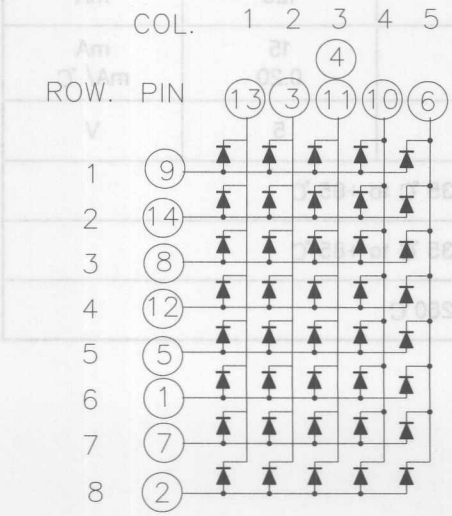
Pin Connection

Pin No.	Connection	
	LTP-14158	LTP-14058
1	Anode Row 6	Cathode Row 6
2	Anode Row 8	Cathode Row 8
3	Cathode Column 2	Anode Column 2
4	Cathode Column 3	Anode Column 3
5	Anode Row 5	Cathode Row 5
6	Cathode Column 5	Anode Column 5
7	Anode Row 7	Cathode Row 7
8	Anode Row 3	Cathode Row 3
9	Anode Row 1	Cathode Row 1
10	Cathode Column 4	Anode Column 4
11	Cathode Column 3	Anode Column 3
12	Anode Row 4	Cathode Row 4
13	Cathode Column 1	Anode Column 1
14	Anode Row 2	Cathode Row 2

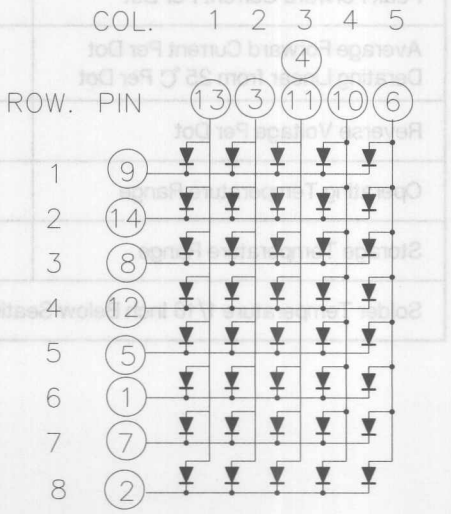
Pin No.	Connection	
	LTP-14958	LTP-14858
1	Cathode Column 1 Green	Anode Column 1 Green
2	Cathode Column 1 Orange	Anode Column 1 Orange
3	Cathode Column 2 Green	Anode Column 2 Green
4	Cathode Column 3 Green	Anode Column 3 Green
5	Anode Row 5	Cathode Row 5
6	Anode Row 7	Cathode Row 7
7	Anode Row 8	Cathode Row 8
8	Anode Row 6	Cathode Row 6
9	Cathode Column 5 Orange	Anode Column 5 Orange
10	Cathode Column 5 Green	Anode Column 5 Green
11	Cathode Column 4 Green	Anode Column 4 Green
12	Cathode Column 4 Orange	Anode Column 4 Orange
13	Cathode Column 3 Orange	Anode Column 3 Orange
14	Anode Row 3	Cathode Row 3
15	Anode Row 2	Cathode Row 2
16	Cathode Column 2 Orange	Anode Column 2 Orange
17	Anode Row 4	Cathode Row 4
18	Anode Row 1	Cathode Row 1

Internal Circuit Diagrams

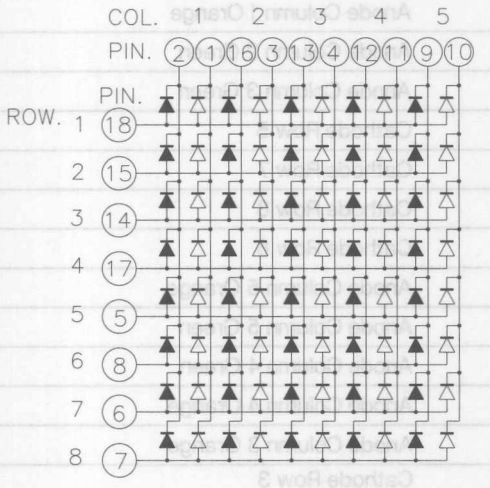
A. LTP-14158A



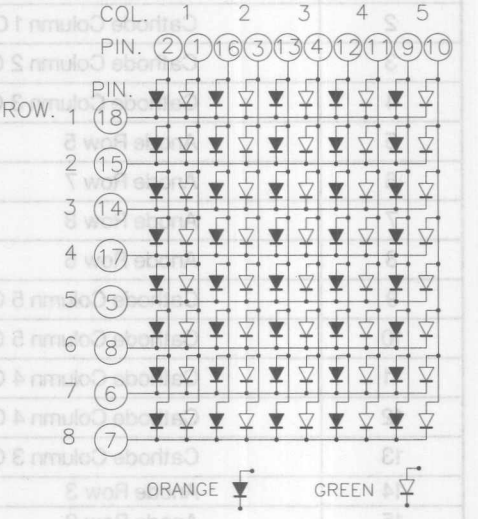
B. LTP-14058A



C. LTP-14958A



D. LTP-14858A



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	36	36	36	mW
Peak Forward Current Per Dot	100	100	125	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	13 0.17	13 0.17	15 0.20	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

LTP-14058AG/14158AG & LTP-14858AA/14958AA(Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-14058AE/14158AE & LTP-14858AA/14958AA(Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-14058AC/14158AC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	5400	12000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		1.8	2.4	V	IF=20mA
			2.0	2.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

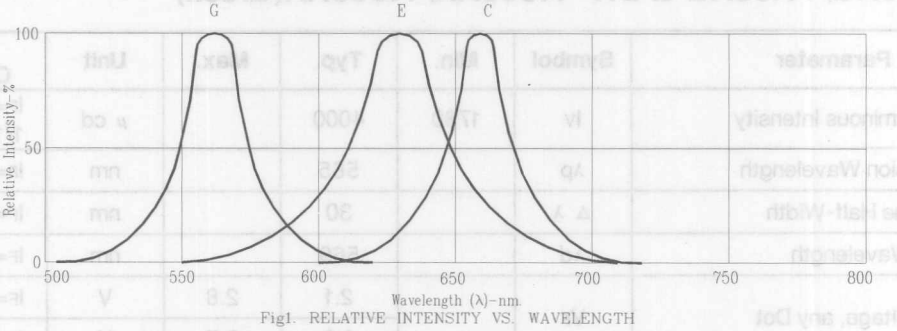


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

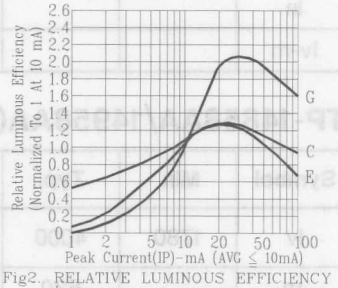


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

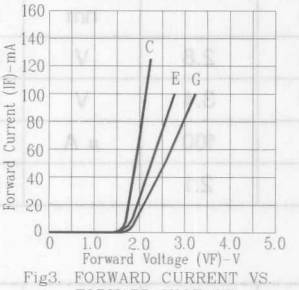


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

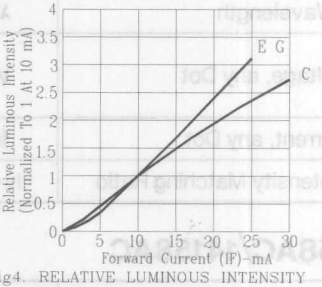


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

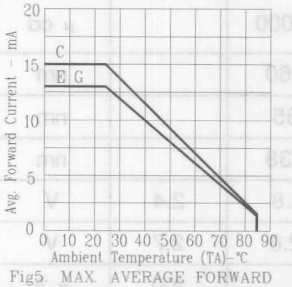


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

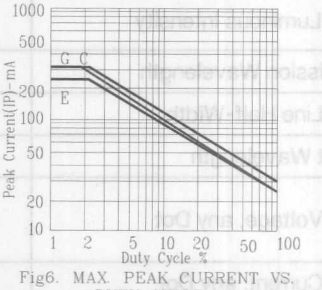


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

5 ϕ 5 × 8 Single Color & Multicolor Dot Matrix LED Displays

LTP-2058A/2158A Series
2458AA/2558AA

Features

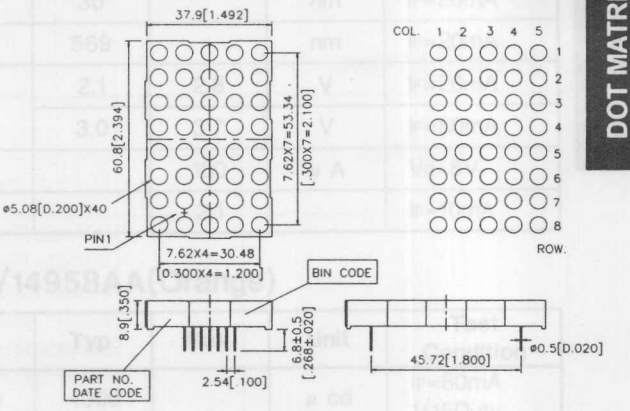
- 2.3 inch (58.42mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- 5 × 8 array with X-Y select
- Compatible with usascll and ebcdic codes.
- Stackable vertically and horizontally.
- Choices of two matrix orientation cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and yellow (green and orange mixed)

Description

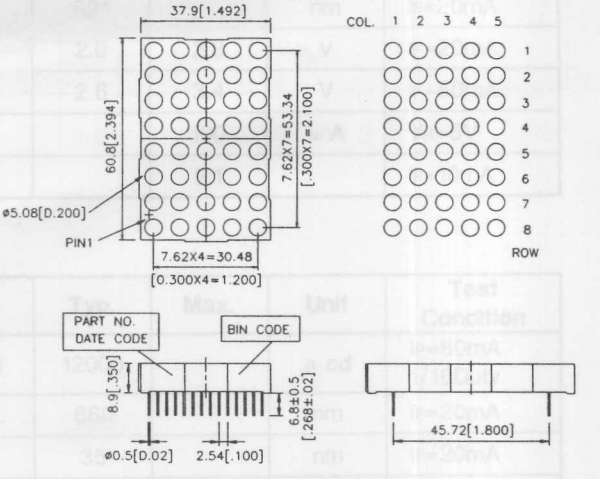
The LTP-2X58A series are 2.3 inch (58.42mm) matrix height 5 × 8 dot matrix displays.
The LTP-2458AA/2558AA are multicolor applicable displays. The multicolor displays have gray face and white dots.
The LTP-2058/2158A series are single color displays.
The green, ultra bright red and orange displays have gray face and white dots.
The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate.
The orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-2058A/2158A



B. LTP-2458AA/2558AA



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
2058AG	2058AE	2058AC	–	Anode Column, Cathode Row	A	A
2158AG	2158AE	2158AC	–	Cathode Column, Anode Row	A	B
–	–	–	2458AA	Anode Column, Cathode Row	B	C
–	–	–	2558AA	Cathode Column, Anode Row	B	D

Pin Connection

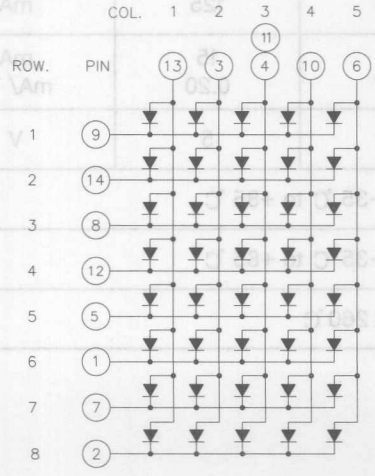
Pin No.	Connection	
	A. LTP-2058A	B. LTP-2158A
1	Cathode Row 6	Anode Row 6
2	Cathode Row 8	Anode Row 8
3	Anode Column 2	Cathode Column 2
4	Anode Column 3*1	Cathode Column 3*1
5	Cathode Row 5	Anode Row 5
6	Anode Column 5	Cathode Column 5
7	Cathode Row 7	Anode Row 7
8	Cathode Row 3	Anode Row 3
9	Cathode Row 1	Anode Row 1
10	Anode Column 4	Cathode Column 4
11	Anode Column 3*1	Cathode Column 3*1
12	Cathode Row 4	Anode Row 4
13	Anode Column 1	Cathode Column 1
14	Cathode Row 2	Anode Row 2

Notes : 1. Pin 4 & 11 Are Internally Connected.

Pin No.	Connection	
	C. LTP-2458AA	D. LTP-2558AA
1	Cathode Row 6 Green	Anode Row 6 Green
2	Cathode Row 6 Orange	Anode Row 6 Orange
3	Cathode Row 8 Green	Anode Row 8 Green
4	Cathode Row 8 Orange	Anode Row 8 Orange
5	Anode Column 2 Green	Cathode Column 2 Green
6	Anode Column 2 Orange	Cathode Column 2 Orange
7	Anode Column 3 Green	Cathode Column 3 Green
8	Anode Column 3 Orange	Cathode Column 3 Orange
9	Cathode Row 5 Green	Anode Row 5 Green
10	Cathode Row 5 Orange	Anode Row 5 Orange
11	Anode Column 5 Green	Cathode Column 5 Green
12	Anode Column 5 Orange	Cathode Column 5 Orange
13	Cathode Row 7 Green	Anode Row 7 Green
14	Cathode Row 7 Orange	Anode Row 7 Orange
15	Cathode Row 3 Green	Anode Row 3 Green
16	Cathode Row 3 Orange	Anode Row 3 Orange
17	Cathode Row 1 Green	Anode Row 1 Green
18	Cathode Row 1 Orange	Anode Row 1 Orange
19	Anode Column 4 Green	Cathode Column 4 Green
20	Anode Column 4 Orange	Cathode Column 4 Orange
21	Anode Column 3 Green	Cathode Column 3 Green
22	Anode Column 3 Orange	Cathode Column 3 Orange
23	Cathode Row 4 Green	Anode Row 4 Green
24	Cathode Row 4 Orange	Anode Row 4 Orange
25	Anode Column 1 Green	Cathode Column 1 Green
26	Anode Column 1 Orange	Cathode Column 1 Orange
27	Cathode Row 2 Green	Anode Row 2 Green
28	Cathode Row 2 Orange	Anode Row 2 Orange

Internal Circuit Diagrams

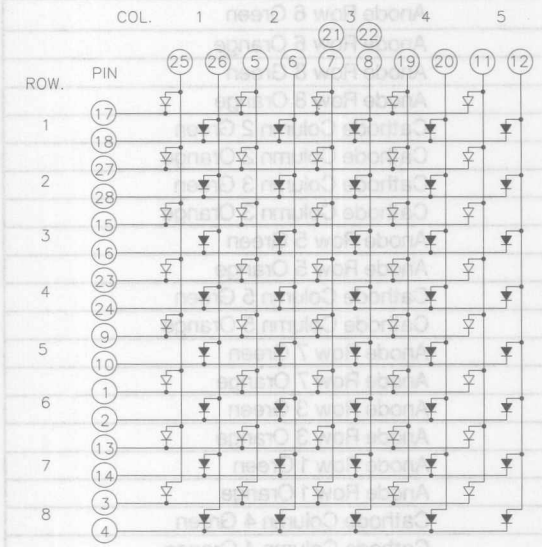
A. LTP-2058A



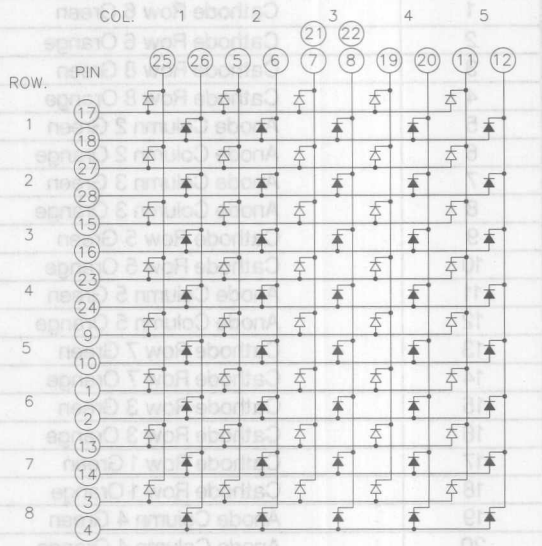
B. LTP-2158A



C. LTP-2458AA



B. LTP-2558AA



Notes : The Sign " ⊣▶⊢ " stands for Orange color chips.
The Sign " ⊣▷⊢ " stands for Green color chips.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	36	36	36	mW
Peak Forward Current Per Dot	100	100	125	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	13 0.17	13 0.17	15 0.20	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃
LTP-2058AG/2158AG & LTP-2458AA/2558AA(Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2058AE/2158AE & LTP-2458AA/2558AA(Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2058AC/2158AC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	6300	12000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		1.8	2.4	V	IF=20mA
			2.0	2.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

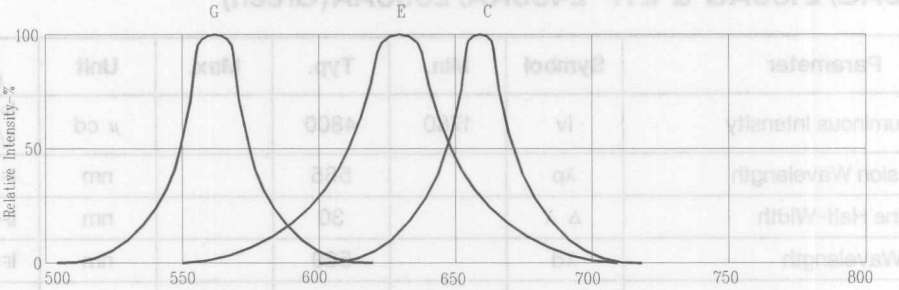


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

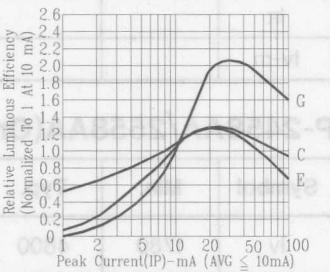


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

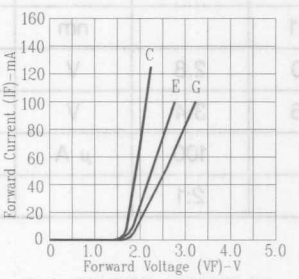


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

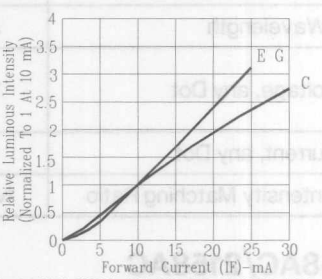


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

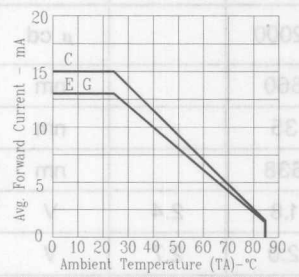


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

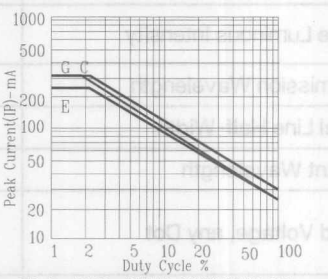


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

1.9 ϕ 8 × 8 Single Color Dot Matrix LED Displays

LTP-7188X Series

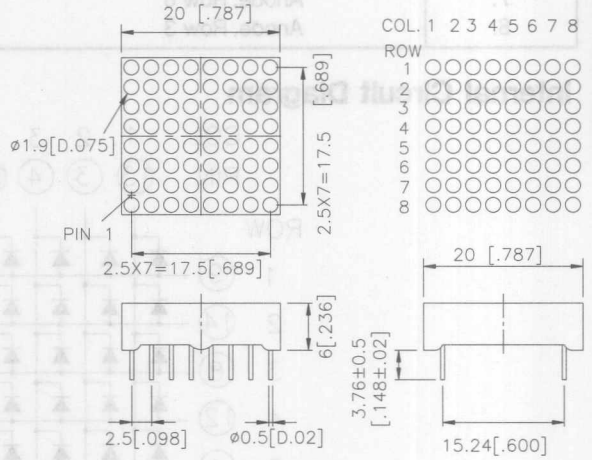
Features

- 0.764 inch (19.4mm)matrix height; 0.098 inch (2.50mm)pitch.
- Continuous uniform dots.
- Low power requirement.
- Excellent characters and appearance.
- High contrast.
- High brightness.
- 8 × 8 array with X-Y select.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.

Description

The LTP-7188X series are 0.764 inch (19.4mm) height 8 × 8 Dot matrix displays.
The green series devices utilize LED chips which are made from Gap on a transparent GaP substrate. The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. The amber series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. The green , orange and amber displays have gray face and white dots.

Package Dimension



Notes : All dimensions are in millimeters(Inchs.)
tolerances : ± 0.25mm(± 0.01") unless otherwise noted.

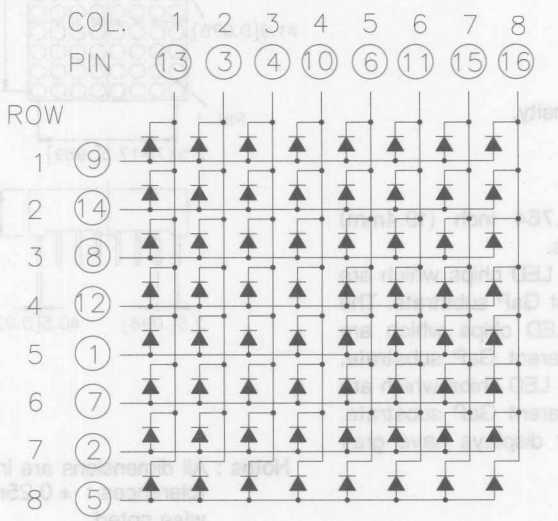
Device

Part No.			Description
Green	Orange	Amber	
LTP-7188G	LTP-7188E	LTP-7188A	Anode Row, Cathode Column

Pin Connection

Pin No.	Connection	Pin No.	Connection
1.	Anode, Row 5	9.	Anode, Row 1
2.	Anode, Row 7	10.	Cathode, Column 4
3.	Cathode, Column 2	11.	Cathode, Column 6
4.	Cathode, Column 3	12.	Anode, Row 4
5.	Anode, Row 8	13.	Cathode, Column 1
6.	Cathode, Column 5	14.	Anode, Row 2
7.	Anode, Row 6	15.	Cathode, Column 7
8.	Anode, Row 3	16.	Cathode, Column 8

Internal Circuit Diagram



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Amber	Unit
Average Power Dissipation Per Dot	36	36	36	mW
Peak Forward Current Per Dot	100	100	100	mA
Average Forward Current Per Dot Derating Linear From 25 ℃ Per Dot	13 0.17	13 0.17	13 0.17	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane For 3 Seconds At 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

LTP-7188G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	630	2000		μ cd	IP=80mA 1/16DUTY
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage. any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-7188E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	630	2000		μ cd	IP=80mA 1/16DUTY
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage. any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-7188A

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IP=80mA 1/16DUTY
Peak Emission Wavelength	λp		600		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		602		nm	IF=20mA
Forward Voltage. any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

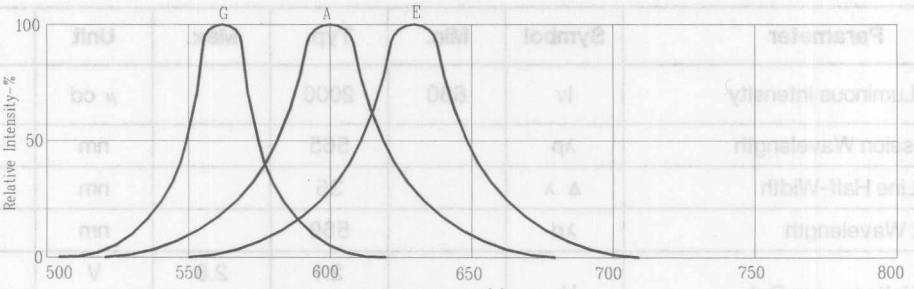


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

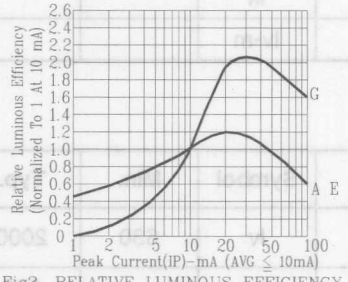


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

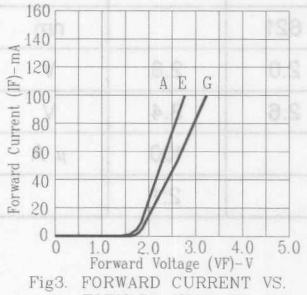


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

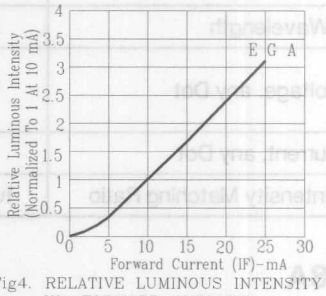


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

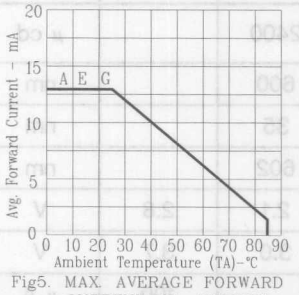


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

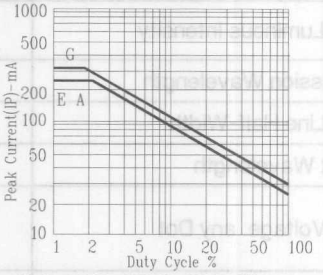


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: A=AMBER G=GREEN E=ORANGE (REFRESH RATE 1KHz)

5 ϕ 8 × 8 Single Color & Multicolor Dot Matrix LED Displays

LTP-18088
18188A Series

Features

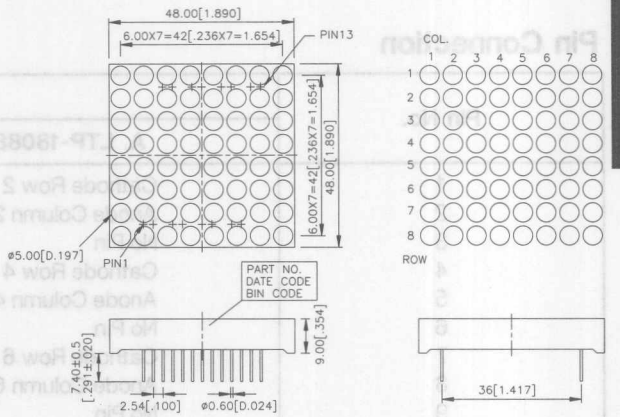
- 1.85 inch (47.0mm) matrix height.
- Low Power requirement.
- Single plane, wide viewing angle.
- 8 × 8 array with X-Y select
- Compatible with usascll and ebcdic codes.
- Stackable vertically and horizontally.
- Choices of two matrix orientation Cathode row or Cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and yellow (green and orange mixed)

Description

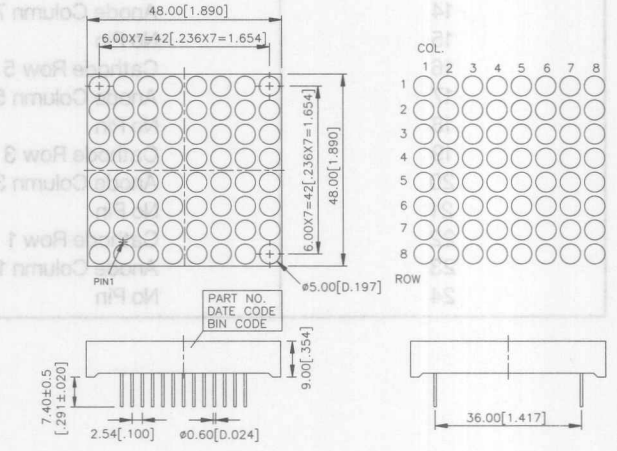
The LTP-18X88 series are 1.85 inch (47.0mm)matrix height 8 × 8 dot matrix displays.
The LTP-18188A are multicolor applicable displays.
The multicolor displays have black face and white dots.
The LTP-18088 series are single color displays. The green, orange and ultra bright red displays have black face and white dots.
The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-18088



B. LTP-18188A



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

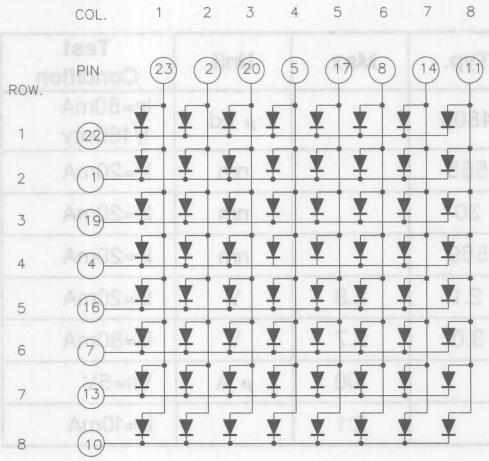
Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
18088G	18088E	18088C	–	Anode Column, Cathode Row	A	A
–	–	–	18188A	Anode Column, Cathode Row	B	B

Pin Connection

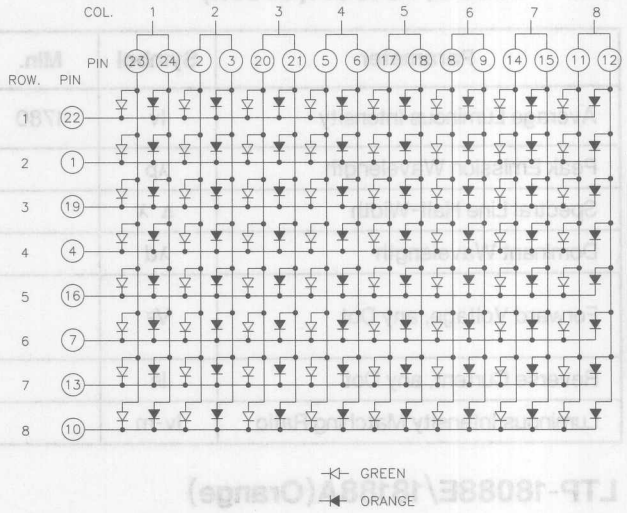
Pin No.	Connection	
	A. LTP-18088	B. LTP-18188A
1	Cathode Row 2	Cathode Row 2
2	Anode Column 2	Anode Column 2 Green
3	No Pin	Anode Column 2 Orange
4	Cathode Row 4	Cathode Row 4
5	Anode Column 4	Anode Column 4 Green
6	No Pin	Anode Column 4 Orange
7	Cathode Row 6	Cathode Row 6
8	Anode Column 6	Anode Column 6 Green
9	No Pin	Anode Column 6 Orange
10	Cathode Row 8	Cathode Row 8
11	Anode Column 8	Anode Column 8 Green
12	No Pin	Anode Column 8 Orange
13	Cathode Row 7	Cathode Row 7
14	Anode Column 7	Anode Column 7 Green
15	No Pin	Anode Column 7 Orange
16	Cathode Row 5	Cathode Row 5
17	Anode Column 5	Anode Column 5 Green
18	No Pin	Anode Column 5 Orange
19	Cathode Row 3	Cathode Row 3
20	Anode Column 3	Anode Column 3 Green
21	No Pin	Anode Column 3 Orange
22	Cathode Row 1	Cathode Row 1
23	Anode Column 1	Anode Column 1 Green
24	No Pin	Anode Column 1 Orange

Internal Circuit Diagrams

A. LTP-18088



B. LTP-18188A



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	36	36	36	mW
Peak Forward Current Per Dot	100	100	125	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	13 0.17	13 0.17	15 0.20	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃
LTP-18088G/18188A(Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-18088E/18188A(Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-18088C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	6300	12000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		1.8	2.4	V	IF=20mA
			2.0	2.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperatrue Unless Otherwise Noted)

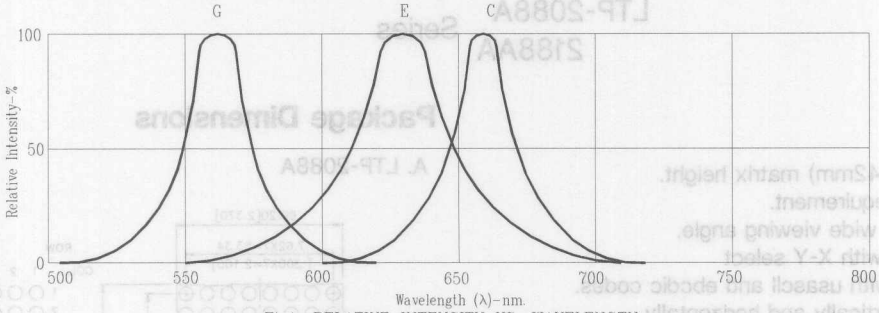


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

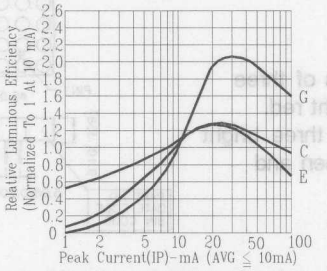


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

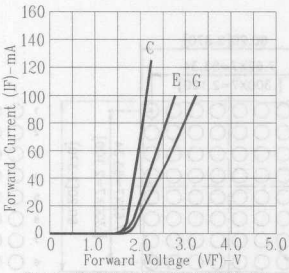


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

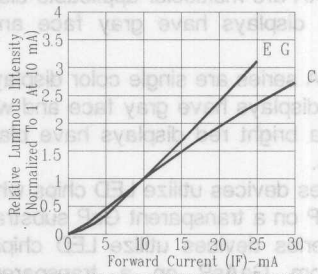


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

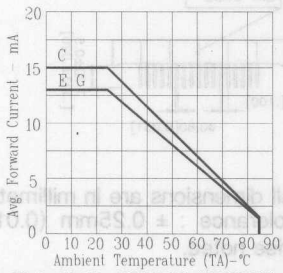


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

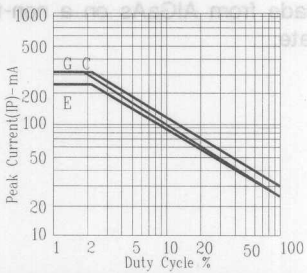


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

LITEON

5 ϕ 8 × 8 Single Color & Multicolor Dot Matrix LED Displays

LTP-2088A
2188AA Series

Features

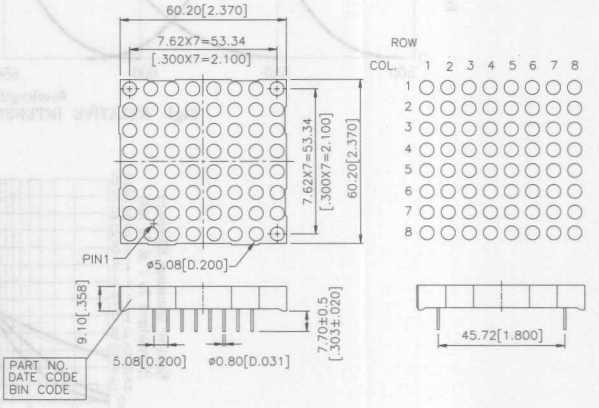
- 2.3 inch (58.42mm) matrix height.
- Low power requirement.
- Single plane, wide viewing angle.
- 8 × 8 array with X-Y select
- Compatible with usascll and ebcdic codes.
- Stackable vertically and horizontally.
- Choices of two matrix orientation cathode row or cathode column.
- Easy mounting on P.C. board.
- Categorized for luminous intensity.
- Single color displays have the choices of three bright colors-green/orange/ultra bright red.
- Multicolor displays are applicable to three bright colors : green, orange and yellow (green and orange mixed)

Description

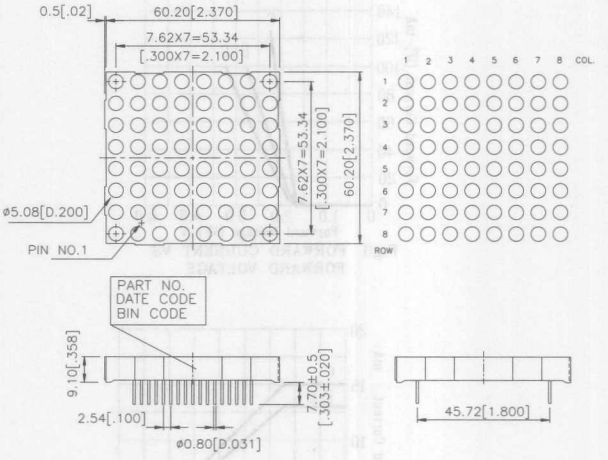
The LTP-2X88A series are 2.3 inch (58.42mm) matrix height 8 × 8 dot matrix displays.
The LTP-2188AA are multicolor applicable displays.
The multicolor displays have gray face and white dots.
The LTP-2088A series are single color displays. The green, orange displays have gray face and white dot color. The ultra bright red displays have black face and white dots.
The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate.
The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.

Package Dimensions

A. LTP-2088A



B. LTP-2188AA



Notes : All dimensions are in millimeters(inches).
Tolerance : ± 0.25mm (0.01") unless otherwise noted.

Devices

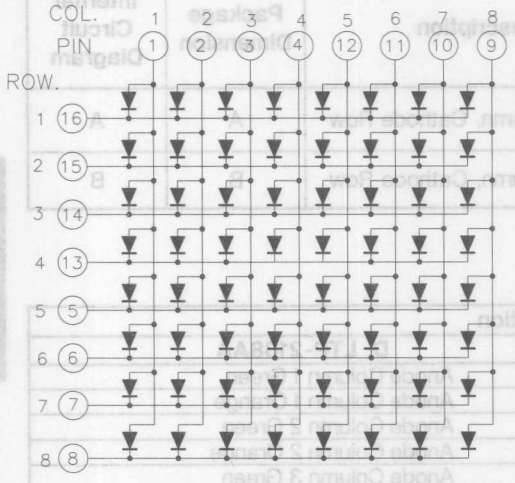
Part No. LTP-				Description	Package Dimension	Internal Circuit Diagram
Green	Orange	Ultra Bright Red	Multi-Color			
2088AG	2088AE	2088AC	–	Anode Column, Cathode Row	A	A
–	–	–	2188AA	Anode Column, Cathode Row	B	B

Pin Connection

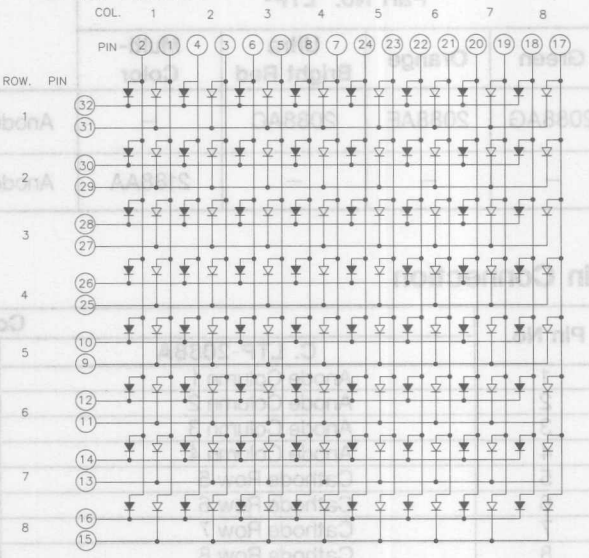
Pin No.	Connection	
	C. LTP-2088A	D. LTP-2188AA
1	Anode Column 1	Anode Column 1 Green
2	Anode Column 2	Anode Column 1 Orange
3	Anode Column 3	Anode Column 2 Green
4	Anode Column 4	Anode Column 2 Orange
5	Cathode Row 5	Anode Column 3 Green
6	Cathode Row 6	Anode Column 3 Orange
7	Cathode Row 7	Anode Column 4 Green
8	Cathode Row 8	Anode Column 4 Orange
9	Anode Column 8	Cathode Row 5 Green
10	Anode Column 7	Cathode Row 5 Orange
11	Anode Column 6	Cathode Row 6 Green
12	Anode Column 5	Cathode Row 6 Orange
13	Cathode Row 4	Cathode Row 7 Green
14	Cathode Row 3	Cathode Row 7 Orange
15	Cathode Row 2	Cathode Row 8 Green
16	Cathode Row 1	Cathode Row 8 Orange
17		Anode Column 8 Green
18		Anode Column 8 Orange
19		Anode Column 7 Green
20		Anode Column 7 Orange
21		Anode Column 6 Green
22		Anode Column 6 Orange
23		Anode Column 5 Green
24		Anode Column 5 Orange
25		Cathode Row 4 Green
26		Cathode Row 4 Orange
27		Cathode Row 3 Green
28		Cathode Row 3 Orange
29		Cathode Row 2 Green
30		Cathode Row 2 Orange
31		Cathode Row 1 Green
32		Cathode Row 1 Orange

Internal Circuit Diagrams

A. LTP-2088A



B. LTP-2188AA



Notes : The Sign " ▶|— " stands for Orange color dice.
The Sign " —|◁ " stands for Green color dice.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	Orange	Ultra Bright Red	Unit
Average Power Dissipation Per Dot	36	36	36	mW
Peak Forward Current Per Dot	100	100	125	mA
Average Forward Current Per Dot Derating Linear from 25 ℃ Per Dot	13 0.17	13 0.17	15 0.20	mA mA/ ℃
Reverse Voltage Per Dot	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃
LTP-2088AG/2188AA(Green)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage, any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2088AE/2188AA(Orange)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	1780	4800		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λd		621		nm	IF=20mA
Forward Voltage, any Dot	VF		2.0	2.8	V	IF=20mA
			2.6	3.4	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-2088AC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	6300	12000		μ cd	IP=80mA 1/16Duty
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage, any Dot	VF		1.8	2.4	V	IF=20mA
			2.0	2.7	V	IF=80mA
Reverse Current, any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

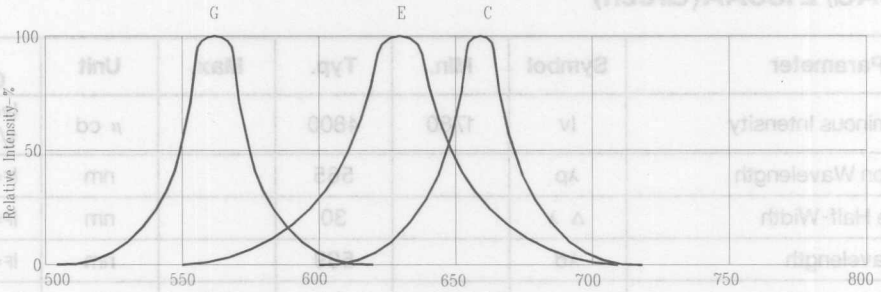


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

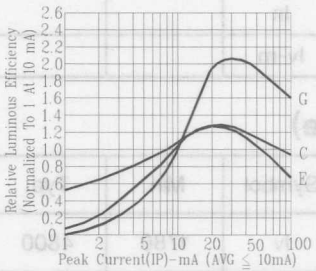


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

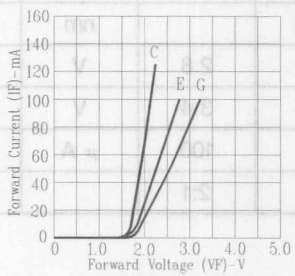


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

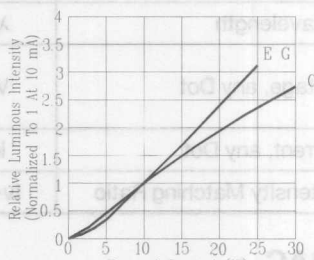


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

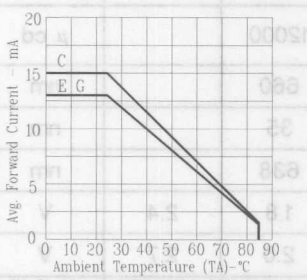


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

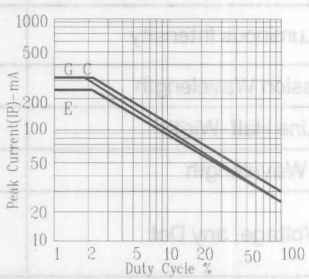


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE %
(REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE C=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

3 ϕ 16 × 16 Multicolor Dot Matrix LED Displays

LTP-254FFM-02 Series

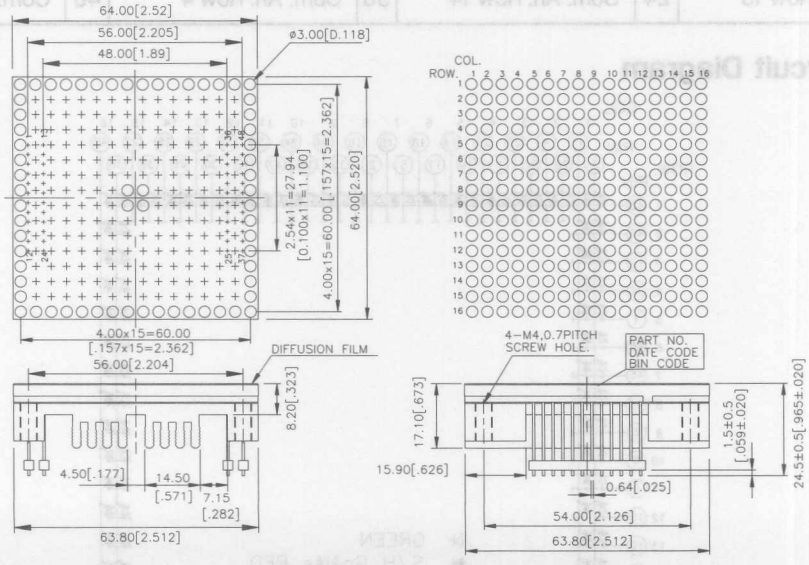
Features

- 2.52 inch (64.00mm) matrix height.
- Low power requirements.
- Excellent characters and appearance.
- High contrast.
- High brightness.
- Wide viewing angle.
- 16 × 16 array with X-Y select.
- Stackable vertically and horizontally.
- Categorized for luminous intensity.

Description

The LTP-254FFM-02 Is 2.52 inch (64.00mm) matrix height 16 × 16 dot matrix displays.
This display utilizes standard green & S/H GaAlAs red LED chips. The green LED chips are made from GaP on transparent GaP substrate. The ultra bright red LED chips are made from GaAlAs on a GaAs substrate. and it has black face and a diffusion film is added on it.

Package Dimension



Notes : All dimensions are in millimeters(Inchs.) tolerance is :
± 0.25mm(0.01")unless otherwise Noted.

Device

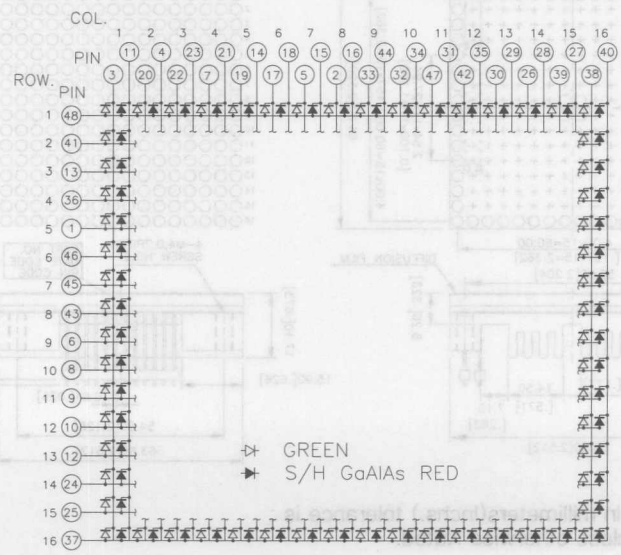
Part No.	Source Color	Description
LTP-254FFM-02	Green & S/H GaAlAs Red	16 × 16 Dot Matrix Anode Row Cathode Column

Pin Connection

(Com.=Common, An.=Anode, Ca.= Cathode, Col.=Column)

No	Connection	No	Connection	No	Connection	No	Connection
1	Com. An. Row 5	13	Com. An. Row 3	25	Com. An. Row 15	37	Com. An. Row 16
2	Ca. Column 8 Green	14	Ca. Column 5 Red	26	Ca. Column 14 Green	38	Ca. Column 16 Green
3	Ca. Column 1 Green	15	Ca. Column 7 Red	27	Ca. Column 15 Red	39	Ca. Column 15 Green
4	Ca. Column 2 Red	16	Ca. Column 8 Red	28	Ca. Column 14 Red	40	Ca. Column 16 Red
5	Ca. Column 7 Green	17	Ca. Column 6 Green	29	Ca. Column 13 Red	41	Com. An. Row 2
6	Ca. Column Row 9	18	Ca. Column 6 Red	30	Ca. Column 13 Green	42	Ca. Column 12 Green
7	Ca. Column 4 Green	19	Ca. Column 5 Green	31	Ca. Column 11 Red	43	Com. An. Row 8
8	Com. An. Row 10	20	Ca. Column 2 Green	32	Ca. Column 10 Green	44	Ca. Column 1 Red
9	Com. An. Row 11	21	Ca. Column 4 Red	33	Ca. Column 9 Green	45	Com. An. Row 7
10	Com. An. Row 12	22	Ca. Cloumn 3 Green	34	Ca. Column 10 Red	46	Com. An. Row 6
11	Ca. Column 1 Red	23	Ca. Column 3 Red	35	Ca. Column 12 Red	47	Ca. Column 11 Green
12	Com. An. Row 13	24	Com. An. Row 14	36	Com. An. Row 4	48	Com. An. Row 1

Internal Circuit Diagram



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Green	S/H GaAlAs Red	Unit
Average Power Dissipation Per Dot	75	75	mW
Peak Forward Current Per Dot	100	125	mA
Average Forward Current Per Dot Derating Linear From 25 ℃ Per Dot	13 0.17	15 0.20	mA mA/ ℃
Reverse Voltage Per Dot	5	5	V
Operating Temperature Range	-25 ℃ to +65 ℃		
Storage Temperature Range	-25 ℃ to +65 ℃		
Solder Temperature 1/16 Inch Below Seating Plane For 3 Seconds At 260 ℃			

Electrical Optical Characteristics at Ta=25 ℃
Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv		570		μ cd	IP=80mA 1/16DUTY
Peak Emission Wavelength	λp		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λd		569		nm	IF=20mA
Forward Voltage. Any Dot	VF		2.1	2.8	V	IF=20mA
			3.0	3.7	V	IF=80mA
Reverse Current, Any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes : Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (commission international DE L'clairage) Eye-Response curve.

S/H GaAlAs Red

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv		900		μ cd	IP=80mA 1/16DUTY
Peak Emission Wavelength	λp		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		20		nm	IF=20mA
Dominant Wavelength	λd		638		nm	IF=20mA
Forward Voltage. Any Dot	VF		2.3	2.9	V	IF=20mA
			2.5	3.1	V	IF=80mA
Reverse Current, Any Dot	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes : Luminous intensity is measured with a light sensor and filter combination that approximates the CLE (commission international DE L'clairage) Eye-Response curve.

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatrue Unless Otherwise Noted)

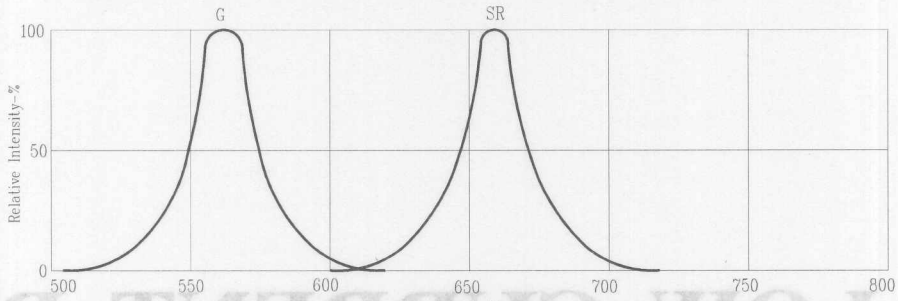


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

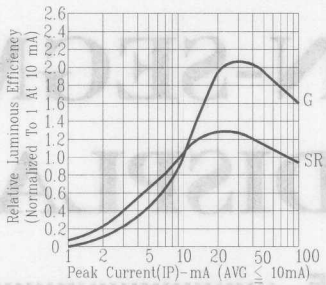


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

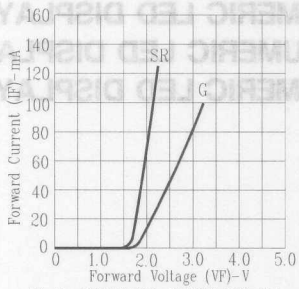


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

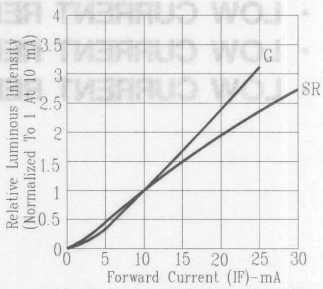


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

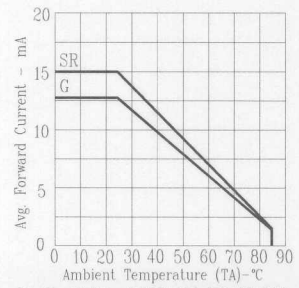


Fig5. MAX. AVERAGE FORWARD CURRENT VS. AMBIENT TEMPERATURE.

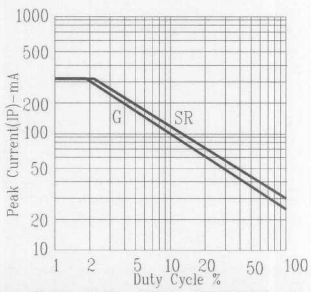


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE %
(REFRESH RATE 1KHz)

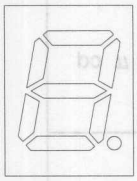
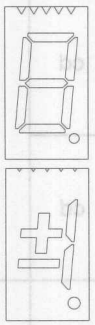
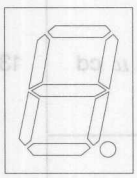
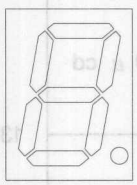
NOTE: G=GREEN SR=ULTRA BRIGHT RED (REFRESH RATE 1KHz)

13. LOW CURRENT RED SEVEN-SEGMENT LED DISPLAYS

- SELECTION GUIDE 13-1
- LOW CURRENT RED SINGLE DIGIT NUMERIC LED DISPLAYS ... 13-6
- LOW CURRENT RED DUAL DIGIT NUMERIC LED DISPLAYS 13-6
- LOW CURRENT RED THREE-DIGIT NUMERIC LED DISPLAYS ... 13-6
- LOW CURRENT RED FOUR-DIGIT NUMERIC LED DISPLAYS 13-6

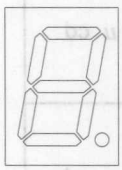
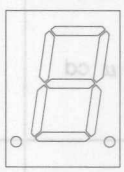
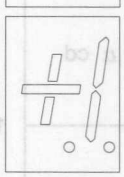
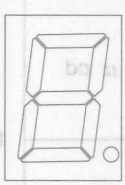
Selection Guide

· Low Current Red Single Digit Numeric LED Displays

Package	Part No.	Color(λ p)	Description	Typ.Iv/Seg. IF=1mA	Page No.
 7mm (.28") Dual-In-Line .39"H × .29"W × .24"D	LTS-2301AWC	Red(660nm)	Common Cathode, Rt. Hand Decimal	600 μ cd	13-6
	2801AWC	Red(660nm)	Common Anode, Rt. Hand Decimal	600 μ cd	
 9.10mm (.36") Dual-In-Line .56"H × .26"W × .34"D	LTS-360WC	Red(660nm)	Common Anode, Rt. Hand Decimal	650 μ cd	13-13
	367WC	Red(660nm)	Common Cathode, Rt. Hand Decimal	650 μ cd	
	368WC	Red(660nm)	Common Cathode, ±1 Overflow	650 μ cd	
 10mm (.4") Dual-In-Line .5"H × .38"W × .28"D	LTS-4301WC	Red(660nm)	Common Cathode, Rt. Hand Decimal	650 μ cd	13-18
	4801WC	Red(660nm)	Common Anode, Rt. Hand Decimal	650 μ cd	
 14.22mm (.56") Dual-In-Line .67"H × .49"W × .32"D	LTS-5001AWC	Red(660nm)	Common Anode, Rt. Hand Decimal	700 μ cd	13-34
	5003AWC	Red(660nm)	Common Cathode, Rt. Hand Decimal	700 μ cd	

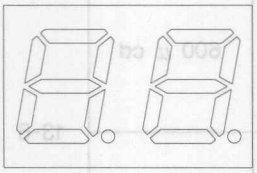
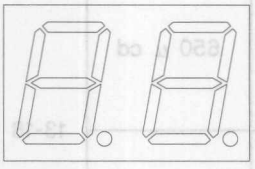
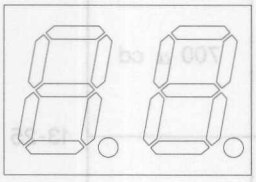
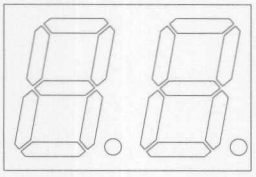
Selection Guide

· Low Current Red Single Digit Numeric LED Displays

Package	Part No.	Color(λ p)	Description	Typ.Iv/Seg. IF=1mA	Page No.
	LTS-546AWC	Red(660nm)	Common Anode, Rt. Hand Decimal	700 μ cd	13-25
	547AWC	Red(660nm)	Common Cathode, Rt. Hand Decimal	700 μ cd	
	548AWC	Red(660nm)	Common Anode, ±1 Overflow	700 μ cd	
13.22mm (.52") Dual-In-Line .7"H × .49"W × .28"D	549AWC	Red(660nm)	Common Cathode, ±1 Overflow	700 μ cd	
	LTS-3401LWC	Red(660nm)	Common Anode, Rt. & Lt. Hand Decimal	700 μ cd	13-40
	3403LWC	Red(660nm)	Common Cathode, Rt. & Lt. Hand Decimal	700 μ cd	
	3406LWC	Red(660nm)	Universal, ±1 Overflow Rt. Hand Decimal	700 μ cd	
20.32mm (.8") Dual-In-Line 1.09"H × .79"W × .33"D					
	LTS-10804WC	Red(660nm)	Common Anode, Rt. Hand Decimal	1200 μ cd	13-45
	10304WC	Red(660nm)	Common Cathode, Rt. Hand Decimal	1200 μ cd	
25.4mm (1.0") Dual-In-Line 1.3"H × .9"W × .34"D					

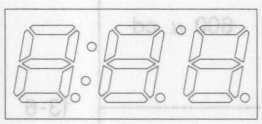
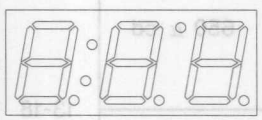
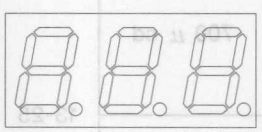
Selection Guide

· Low Current Red Dual Digit Numeric LED Displays

Package	Part No.	Color(λ p)	Description	Typ.Iv/Seg. IF=1mA	Page No.
 7mm (.28") Dual-In-Line .39"H × .59"W × .24"D	LTD-2601WC	Red(660nm)	Dualplex Common Anode Rt. Hand Decimal	600 μ cd	13-6
	2701WC	Red(660nm)	Dualplex Common Cathode Rt. Hand Decimal	600 μ cd	
 10mm (.40") Dual-In-Line .5"H × .78"W × .28"D	LTD-4608WC	Red(660nm)	Dualplex Common Anode Rt. Hand Decimal	650 μ cd	13-18
	4708WC	Red(660nm)	Dualplex Common Cathode Rt. Hand Decimal	650 μ cd	
 13.2mm (.52") Dual-In-Line .69"H × .99"W × .28"D	LTD-5250WC	Red(660nm)	Common Anode, Rt. Hand Decimal	700 μ cd	13-25
	5260WC	Red(660nm)	Common Cathode, Rt. Hand Decimal	700 μ cd	
 14.22mm (.56") Dual-In-Line .67"H × .984"W × .32"D	LTD-5021AWC	Red(660nm)	Common Anode, Rt. Hand Decimal	700 μ cd	13-34
	5023AWC	Red(660nm)	Common Cathode, Rt. Hand Decimal	700 μ cd	

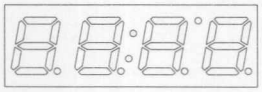
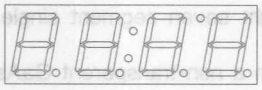
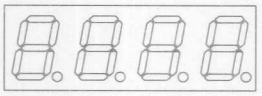
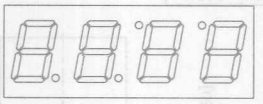
Selection Guide

· Low Current Red Three-Digit Numeric LED Displays

Package	Part No.	Color(λ p)	Description	Typ.Iv/Seg. IF=1mA	Page No.
 7mm (.28") Dual-In-Line .39"H × .89"W × .24"D	LTC-2621WC	Red(660nm)	Multiplex Common Anode Rt. Hand Decimal	600 μ cd	13-6
	2721WC	Red(660nm)	Multiplex Common Cathode Rt. Hand Decimal	600 μ cd	
 10.0mm (.40") Dual-In-Line .5"H × 1.18"W × .276"D	LTC-4624WC	Red(660nm)	Multiplex Common Anode Rt. Hand Decimal	650 μ cd	13-18
	4724WC	Red(660nm)	Multiplex Common Cathode Rt. Hand Decimal	650 μ cd	
 13.2mm (.52") Dual-In-Line .7"H × 1.5"W × .28"D	LTC-5336WC	Red(660nm)	Common Cathode, Rt. Hand Decimal	700 μ cd	13-25
	5836WC	Red(660nm)	Common Anode, Rt. Hand Decimal	700 μ cd	

Selection Guide

· Low Current Red Four-Digit Numeric LED Displays

Package	Part No.	Color(λ p)	Description	Typ.Iv/Seg. IF=1mA	Page No.
 7.0mm (.28") Dual-In-Line .39"H × 1.19"W × .24"D	LTC-2623WC	Red(660nm)	Multiplex Common Anode Rt. Hand Decimal	600 μ cd	13-6
	2723WC	Red(660nm)	Multiplex Common Cathode Rt. Hand Decimal	600 μ cd	
 10mm (.40") Dual-In-Line .5"H × 1.58"W × .28"D	LTC-4627WC	Red(660nm)	Multiplex Common Anode Rt. Hand Decimal	650 μ cd	13-18
	4727WC	Red(660nm)	Multiplex Common Cathode Rt. Hand Decimal	650 μ cd	
 13.2mm (.52") Dual-In-Line .7"H × 2"W × .28"D	LTC-5337WC	Red(660nm)	Common Cathode, Rt. Hand Decimal	700 μ cd	13-25
	5837WC	Red(660nm)	Common Anode, Rt. Hand Decimal	700 μ cd	
 14.22mm (.56") Dual-In-Line .75"H × 1.98"W × .32"D	LTC-5653WC	Red(660nm)	Multiplex Common Anode	700 μ cd	13-34
	LTC-5753WC	Red(660nm)	Multiplex Common Cathode	700 μ cd	

LITEON

0.28" Low Current Red Numeric LED Displays

LTS-2X01AWC
LTD-2000WC Series
LTC-2000WC

Features

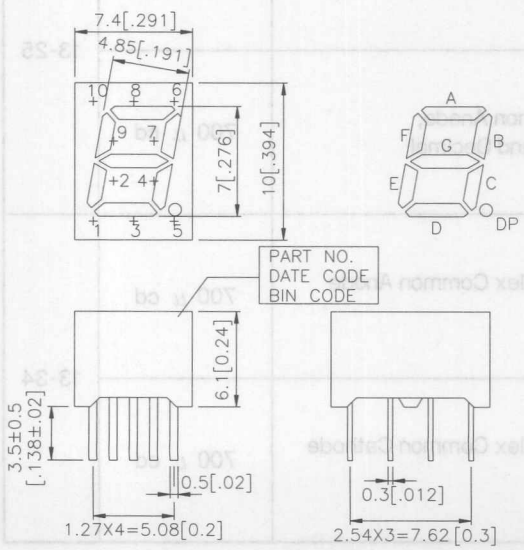
- 0.28 inch (7.0mm) digit height
- Continuous uniform segments.
- Low power consumption.
- Low power requirement.
- Excellent characters appearance.
- Solid state reliability.
- Wide viewing angle.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

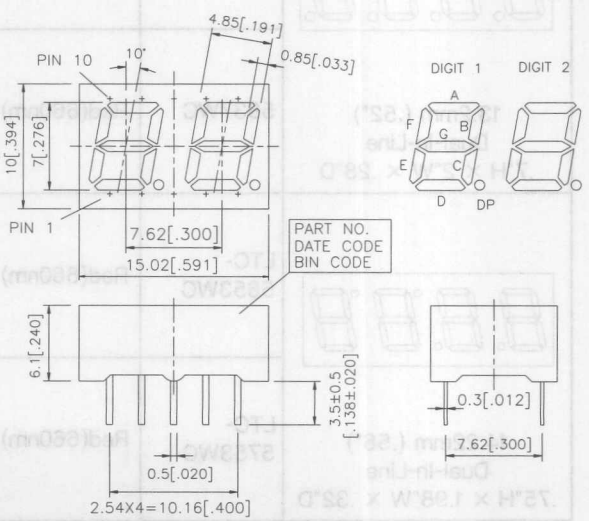
The LTS-2X01AWC, LTD-2000WC, LTC-2000WC series are 0.28 inch (7.0mm) height seven segment single, dual, triple and quadruple digit displays.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate. The devices have gray face and white segments.
These low current seven segment displays are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current. Driver current as low as 1mA per segment is available.

Package Dimensions

A.LTS-2301AWC/2801AWC

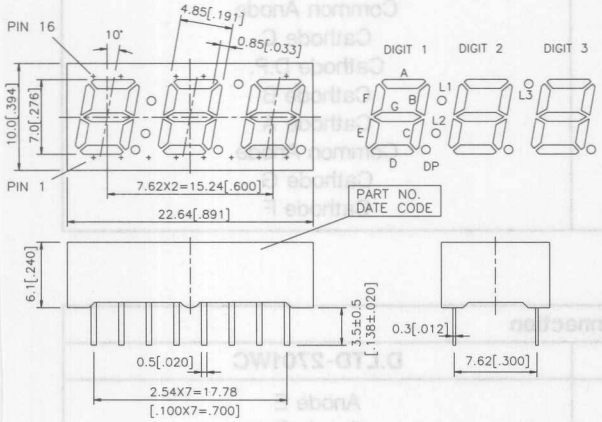


B.LTD-2601WC/2701WC

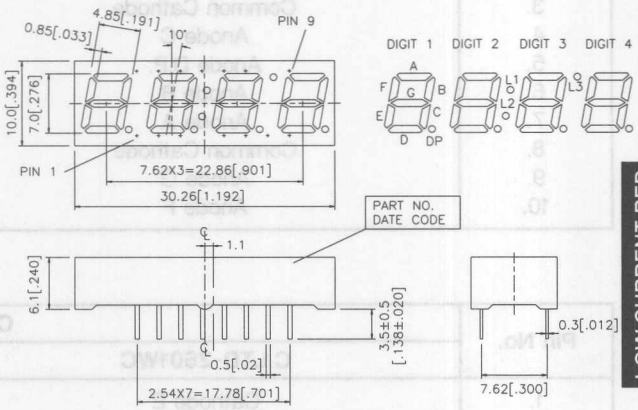


Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

C.LTC-2621WC/2721WC



D.LTC-2623WC/2723WC



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

Devices

Part No.	Description	Package Dimension	Internal Circuit Diagram
Low Current Red			
LTS-2301AWC	Common Cathode, Rt. Hand Decimal	A	A
LTS-2801AWC	Common Anode, Rt. Hand Decimal	A	B
LTD-2601WC	Dualplex Common Anode, Rt. Hand Decimal	B	C
LTD-2701WC	Dualplex Common Cathode, Rt. Hand Decimal	B	D
LTC-2621WC	Multiplex Common Anode, Rt. Hand Decimal	C	E
LTC-2721WC	Multiplex Common Cathode, Rt. Hand Decimal	C	F
LTC-2623WC	Multiplex Common Anode, Rt. Hand Decimal	D	G
LTC-2723WC	Common Common Cathode, Rt. Hand Decimal	D	H

Pin Connection

Pin No.	Connection	
	A.LTS-2301AWC	B.LTS-2801AWC
1.	Anode E	Cathode E
2.	Anode D	Cathode D
3.	Common Cathode	Common Anode
4.	Anode C	Cathode C
5.	Anode D.P.	Cathode D.P.
6.	Anode B	Cathode B
7.	Anode A	Cathode A
8.	Common Cathode	Common Anode
9.	Anode G	Cathode G
10.	Anode F	Cathode F

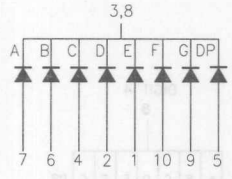
Pin No.	Connection	
	C.LTD-2601WC	D.LTD-2701WC
1.	Cathode E	Anode E
2.	Cathode D	Anode D
3.	Cathode C	Anode C
4.	Cathode G	Anode G
5.	Cathode D.P.	Anode D.P.
6.	Common Anode Digit 2	Common Cathode Digit 2
7.	Cathode A	Anode A
8.	Cathode B	Anode B
9.	Common Anode Digit 1	Common Cathode Digit 1
10.	Cathode F	Anode F

Pin No.	Connection	
	E.LTC-2621WC	F.LTC-2721WC
1.	Cathode D	Anode D
2.	Common Anode Digit 1	Common Cathode Digit 1
3.	Cathode D.P.	Anode D.P.
4.	Cathode E	Anode E
5.	Common Anode Digit 2	Common Cathode Digit 2
6.	Cathode C	Anode C
7.	Cathode G	Anode G
8.	Common Anode Digit 3	Common Cathode Digit 3
9.	No Connection	No Connection
10.	No Pin	No Pin
11.	No Pin	No Pin
12.	Cathode B	Anode B
13.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
14.	No Pin	No Pin
15.	Cathode A	Anode A
16.	Cathode F	Anode F

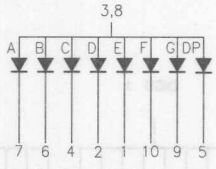
Pin No.	Connetcion	
	G.LTC-2623WC	H.LTC-2723WC
1.	Common Anode Digit 1	Common Cathode Digit 1
2.	Cathode C, L3	Anode C, L3
3.	Cathode D.P.	Anode D.P.
4.	No Connection	No Connection
5.	Cathode E	Anode E
6.	Cathode D	Anode D
7.	Cathode G	Anode G
8.	Common Anode Digit 4	Common Cathode Digit 4
9.	No Connection	No Connection
10.	No Pin	No Pin
11.	Common Anode Digit 3	Common Cathode Digit 3
12.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
13.	Cathode A, L1	Anode A, L1
14.	Common Anode Digit 2	Common Cathode Digit 2
15.	Cathode B, L2	Anode B, L2
16.	Cathode F	Anode F

Internal Circuit Diagrams

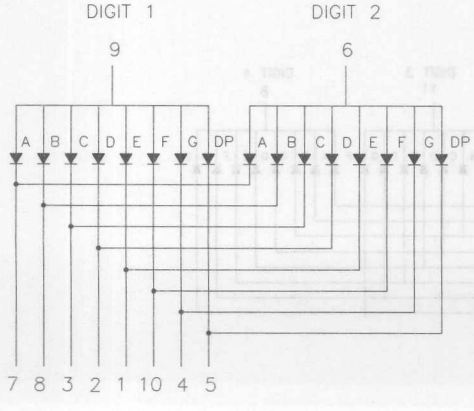
A.LTS-2301AWC



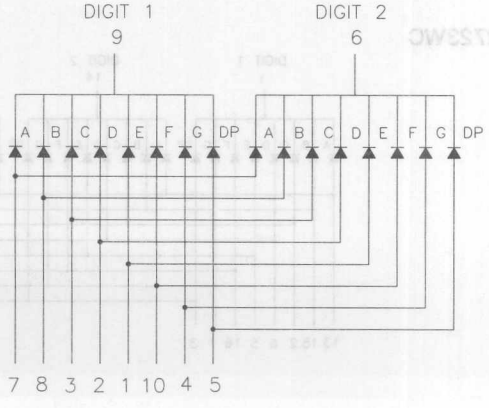
B.LTS-2801AWC



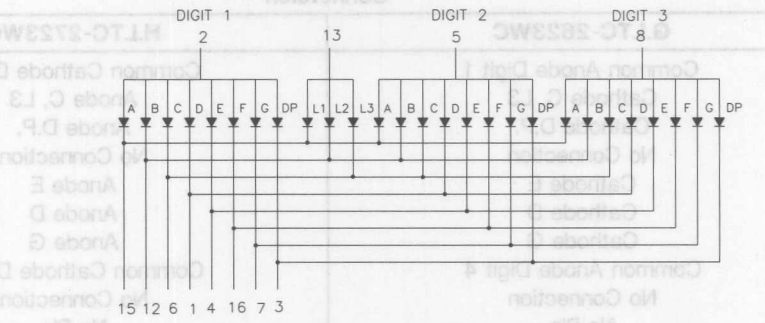
C.LTD-2601WC



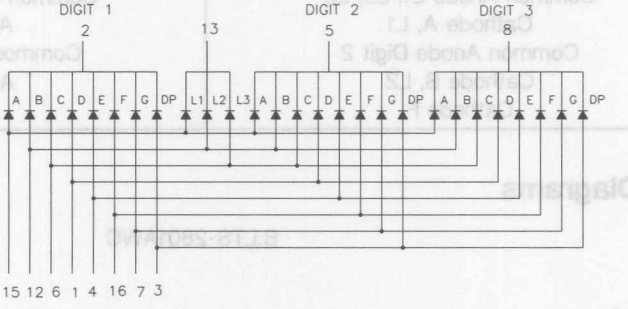
D.LTD-2701WC



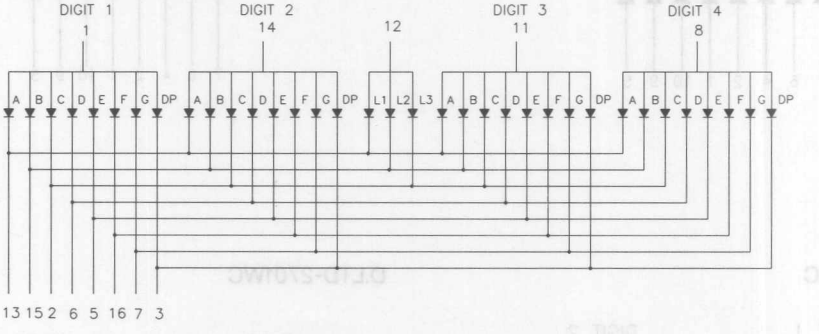
E.LTC-2621WC



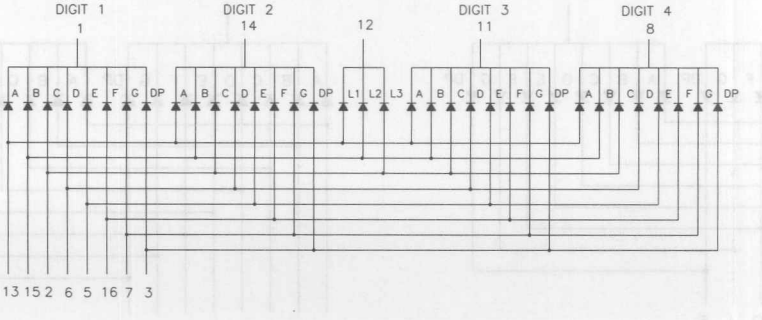
F.LTC-2721WC



G.LTC-2623WC



H.LTC-2723WC



Absolute Maximum Rating at Ta=25 ℃

Parameter	Low Current Red	Unit
Power Dissipation Per Segment	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	125	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	30 0.4	mA mA/ ℃
Reverse Voltage Per Segment	5	V
Operating Temperature Range	-35 ℃ to +85 ℃	
Stroage Temperature Range	-35 ℃ to +85 ℃	
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃		

Electrical/Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	600		μ cd	IF=1mA
			3100			IF=5mA
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Segment	VF		1.6	2.4	V	IF=1mA
			1.7			IF=5mA
			1.8			IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

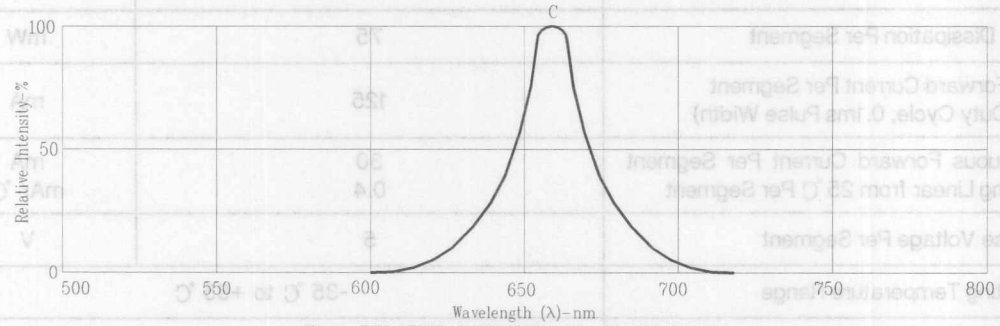


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

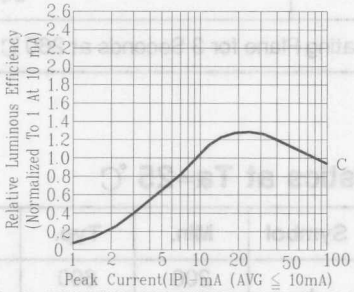


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

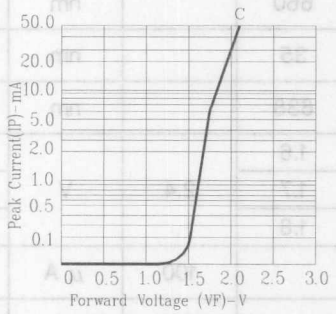


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

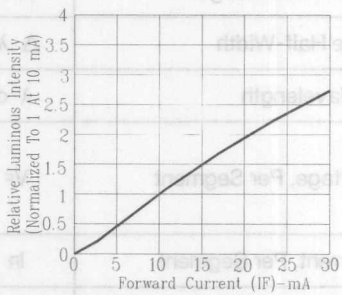


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

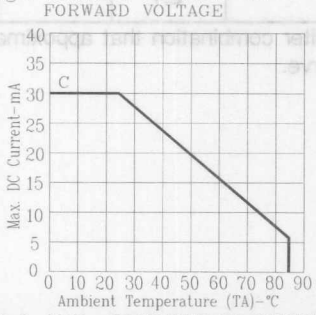


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

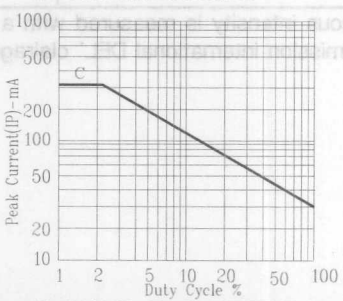


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: C=ULTRABRIGHT RED (REFRESH RATE 1KHz)

0.36" Low Current Red Single Digit Numeric LED Displays

LTS-360WC Series

Features

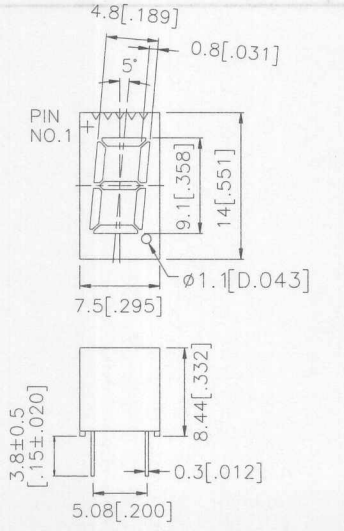
- 0.36 inch (9.1mm) digit height
- Continuous uniform segments.
- Low power consumption.
- Low power requirement.
- Excellent characters appearance.
- Solid state relilability.
- Wide viewing angle.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board.

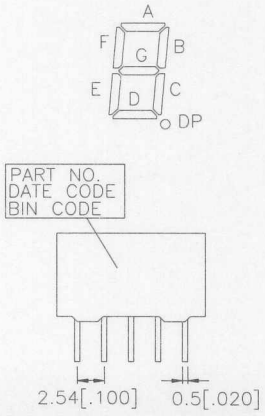
Description

The LTS-360WC are 0.36 inch (9.1mm) height seven segment single digit displays.
The low current red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate. Low current red displays have gray face and white segments.
These low current seven segment displays are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current. Driver current as low as 1mA per segment is available.

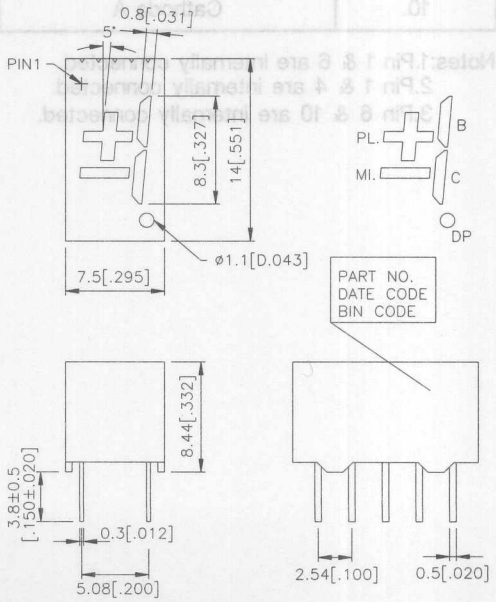
Package Dimensions

A.LTS-360WC/367WC





B.LTS-368WC



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

Devices

Part No. LTS- / Low Current Red	Description	Package Dimension	Internal Circuit Diagram
360WC	Common Anode, Rt. Hand Decimal	A	A
367WC	Common Cathode, Rt. Hand Decimal	A	B
368WC	Common Cathode, ±1 Overflow	B	C

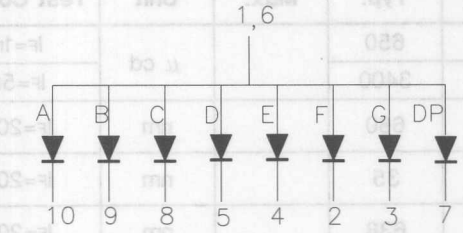
Pin Connection

Pin No.	Connection		
	A.LTS-360WC	B.LTS-367WC	C.LTS-368WC
1.	Command Anode *1	Common Cathode *1	Cathode Pl. & Mi. *2
2.	Cathode F	Anode F	Anode Plus Sign
3.	Cathode G	Anode G	Anode Minus Sign
4.	Cathode E	Anode E	Cathode Pl. & Mi. *2
5.	Cathode D	Anode D	No Pin
6.	Common Anode *1	Common Cathode *1	Cathode B, C & D.P. *3
7.	Cathode D.P.	Anode D.P.	Anode D.P.
8.	Cathode C	Anode C	Anode C
9.	Cathode B	Anode B	Anode B
10.	Cathode A	Anode A	Cathode B, C & D.P. *3

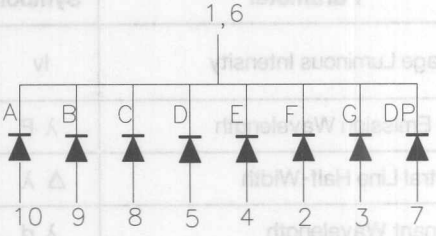
Notes:1.Pin 1 & 6 are internally connected.
2.Pin 1 & 4 are internally connected.
3.Pin 6 & 10 are internally connected.

Internal Circuit Diagrams

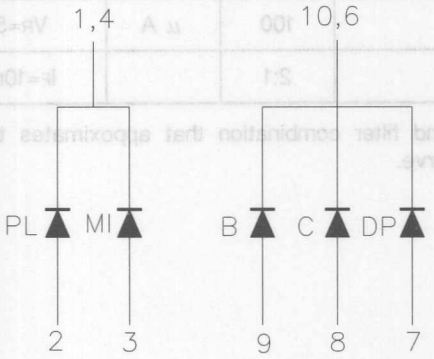
A.LTS-360WC



B.LTS-367WC



C.LTD-368WC



Absolute Maximum Rating at Ta=25 ℃

Parameter	Low Current Red	Unit
Power Dissipation Per Segment	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	125	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	30 0.4	mA mA/ ℃
Reverse Voltage Per Segment	5	V
Operating Temperature Range	-35 ℃ to +85 ℃	
Stroage Temperature Range	-35 ℃ to +85 ℃	
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃		

Electrical/Optical Characteristics at Ta=25 ℃

LTS-360WC/367WC/368WC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	650		μ cd	IF=1mA
			3400			IF=5mA
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Segment	VF		1.6	2.4	V	IF=1mA
			1.7			IF=5mA
			1.8			IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

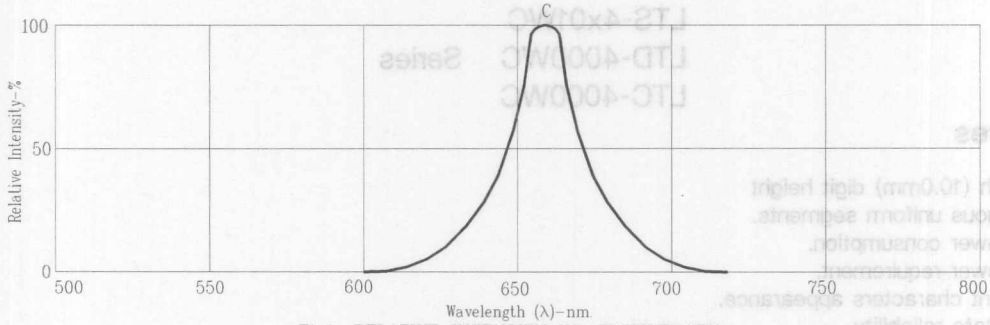


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

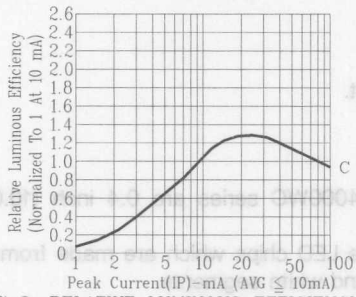


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

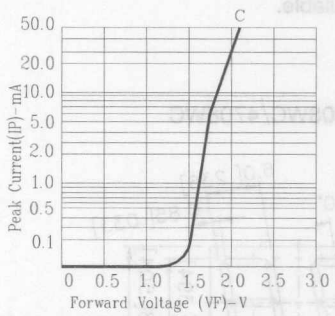


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

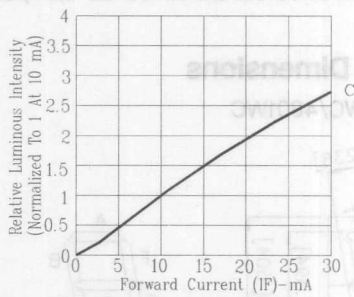


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

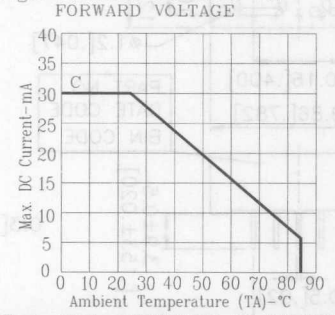


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

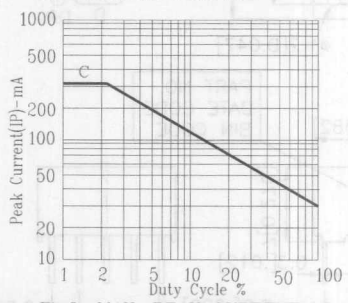


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: C=ULTRABRIGHT RED (REFRESH RATE 1KHz)

0.4" Low Current Red Numeric LED Displays

LTS-4x01WC
LTD-4000WC Series
LTC-4000WC

Features

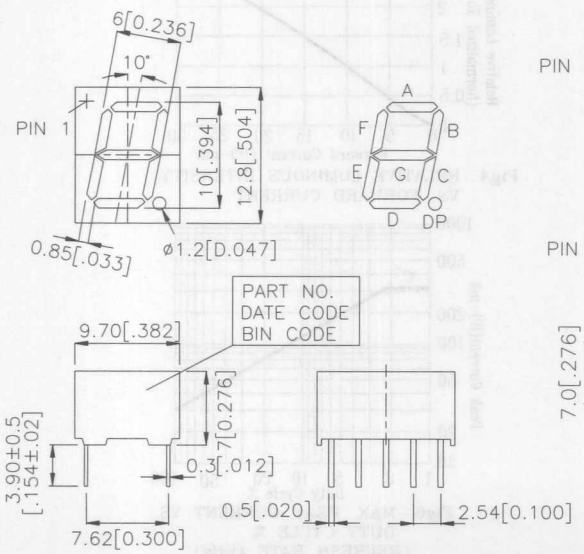
- 0.4 inch (10.0mm) digit height
- Continuous uniform segments.
- Low power consumption.
- Low power requirement.
- Excellent characters appearance.
- Solid state reliability.
- Wide viewing angle.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

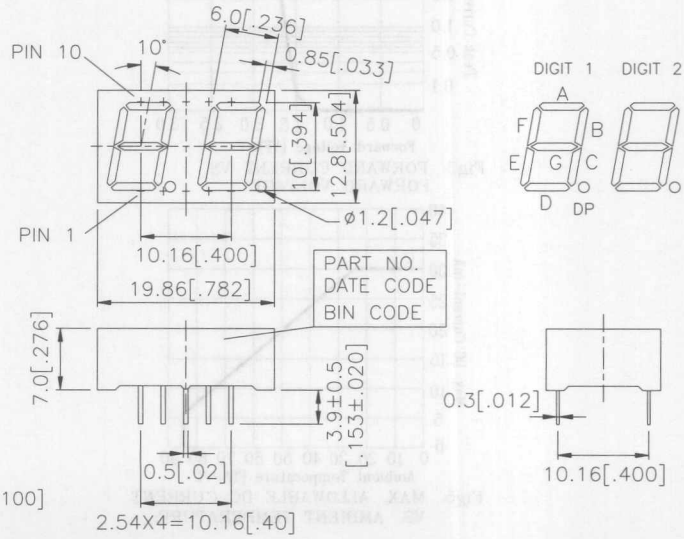
The LTS-4X01WC, LTD-4000WC, LTC-4000WC series are 0.4 inch (10.0mm) height seven segment single, dual, triple and quadruple digit displays.
The ultra bright red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate. The devices have gray face and white segments.
These low current seven segment displays are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current. Drive current as low as 1mA per segment is available.

Package Dimensions

A.LTS-4301WC/4801WC

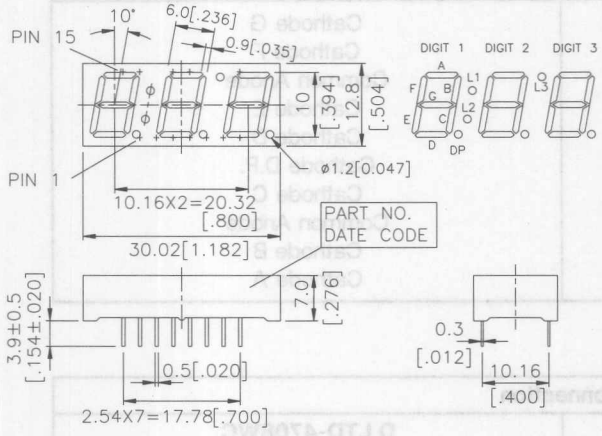


B.LTD-4608WC/4708WC

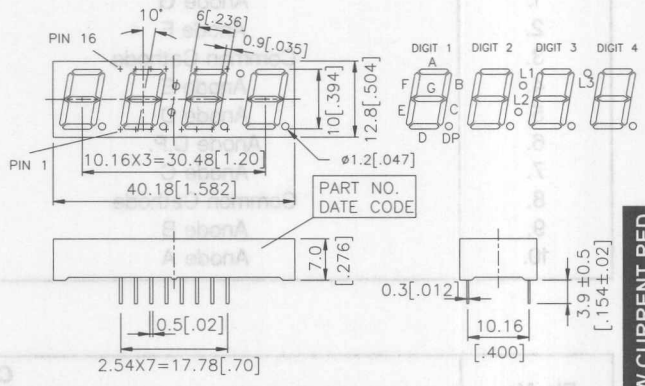


Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

C.LTC-4624WC/4724WC



D.LTC-4627WC/4727WC



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

Devices

Part No.	Description	Package Dimension	Internal Circuit Diagram
Low Current Red			
LTS-4301WC	Common Cathode, Rt. Hand Decimal	A	A
LTS-4801WC	Common Anode, Rt. Hand Decimal	A	B
LTD-4608WC	Dualplex Common Anode, Rt. Hand Decimal	B	C
LTD-4708WC	Dualplex Common Cathode, Rt. Hand Decimal	B	D
LTC-4624WC	Multiplex Common Anode, Rt. Hand Decimal	C	E
LTC-4724WC	Multiplex Common Cathode, Rt. Hand Decimal	C	F
LTC-4627WC	Multiplex Common Anode, Rt. Hand Decimal	D	G
LTC-4727WC	Multiplex Common Cathode, Rt. Hand Decimal	D	H

Pin Connection

Pin No.	Connection	
	A.LTS-4301WC	B.LTS-4801WC
1.	Anode G	Cathode G
2.	Anode F	Cathode F
3.	Common Cathode	Common Anode
4.	Anode E	Cathode E
5.	Anode D	Cathode D
6.	Anode D.P.	Cathode D.P.
7.	Anode C	Cathode C
8.	Common Cathode	Common Anode
9.	Anode B	Cathode B
10.	Anode A	Cathode A

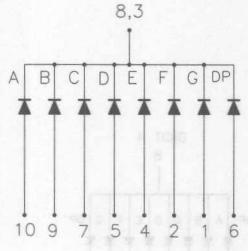
Pin No.	Connection	
	C.LTD-4608WC	D.LTD-4708WC
1.	Cathode C	Anode C
2.	Cathode D.P.	Anode D.P.
3.	Cathode E	Anode E
4.	Common Anode Digit 2	Common Cathode Digit 2
5.	Cathode D	Anode D
6.	Cathode F	Anode F
7.	Cathode G	Anode G
8.	Cathode B	Anode B
9.	Common Anode Digit 1	Common Cathode Digit 1
10.	Cathode A	Anode A

Pin No.	Connection	
	E.LTC-4624WC	F.LTC-4724WC
1.	Common Anode Digit 1	Common Cathode Digit 1
2.	Cathode E	Anode E
3.	Cathode C, L3	Anode C, L3
4.	Cathode D	Anode D
5.	Common Anode Digit 2	Common Cathode Digit 2
6.	Cathode D.P.	Anode D.P.
7.	Common Anode Digit 3	Common Cathode Digit 3
8.	Cathode G	Anode G
9.	No Pin	No Pin
10.	No Pin	No Pin
11.	Cathode B, L2	Anode B, L2
12.	Cathode A, L1	Anode A, L1
13.	No Pin	No Pin
14.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
15.	Cathode F	Anode F

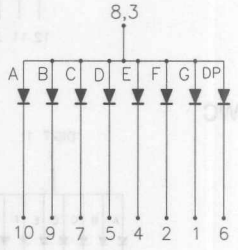
Pin No.	Connetcion	
	G.LTC-4627WC	H.LTC-4727WC
1.	Common Anode Digit 1	Common Cathode Digit 1
2.	Common Anode Digit 2	Common Cathode Digit 2
3.	Cathode D	Anode D
4.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
5.	Cathode E	Anode E
6.	Common Anode Digit 3	Common Cathode Digit 3
7.	Cathode D.P.	Anode D.P.
8.	Common Anode Digit 4	Common Cathode Digit 4
9.	No Connection	No Connection
10.	No Pin	No Pin
11.	Cathode F	Anode F
12.	No Pin	No Pin
13.	Cathode C, L3	Anode C, L3
14.	Cathode A, L1	Anode A, L1
15.	Cathode G	Anode G
16.	Cathode B, L2	Anode B, L2

Internal Circuit Diagrams

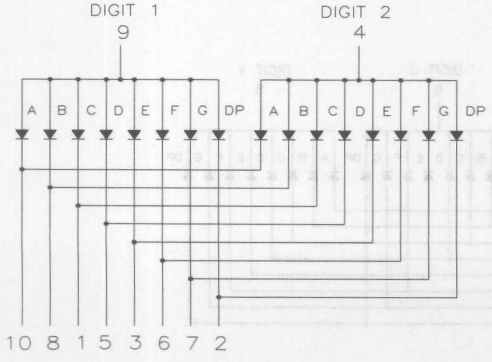
A.LTS-4301WC



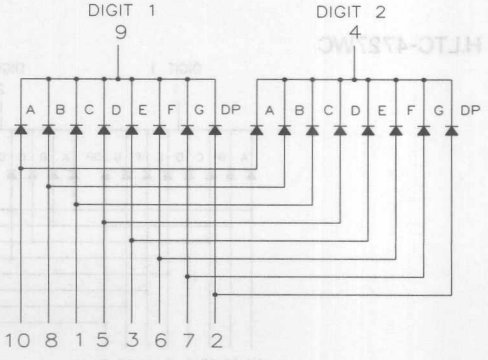
B.LTS-4801WC



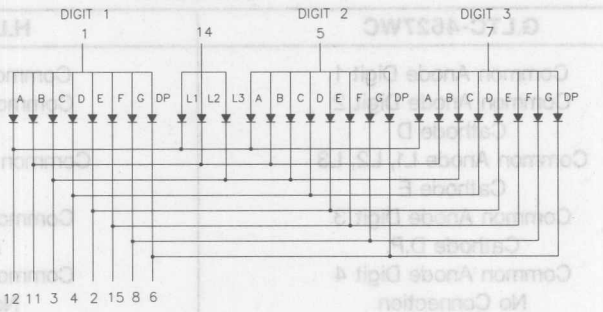
C.LTD-4608WC



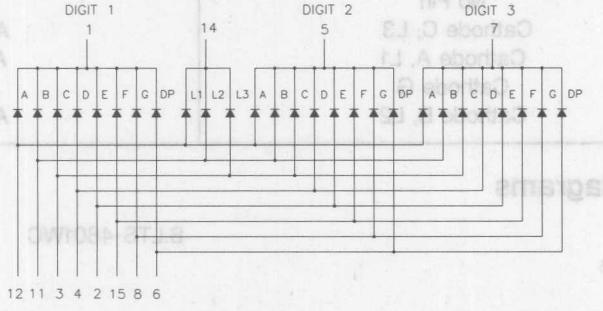
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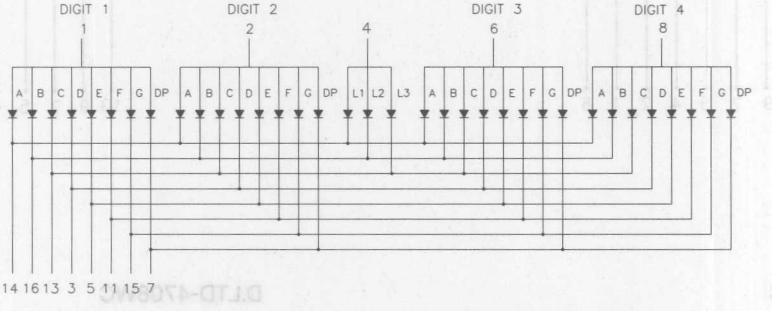
E.LTC-4624WC



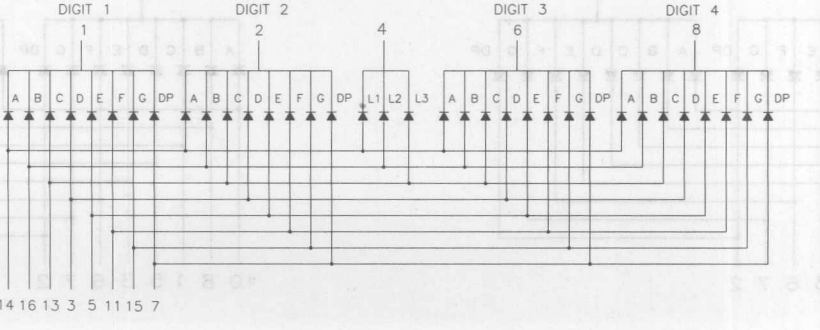
F.LTC-4724WC



G.LTC-4627WC



H.LTC-4727WC



Absolute Maximum Rating at Ta=25 ℃

Parameter	Low Current Red	Unit
Power Dissipation Per Segment	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	125	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	30 0.4	mA mA/ ℃
Reverse Voltage Per Segment	5	V
Operating Temperature Range	-35 ℃ to +85 ℃	
Stroage Temperature Range	-35 ℃ to +85 ℃	
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃		

Electrical/Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	650		μ cd	IF=1mA
			3400			IF=5mA
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Segment	VF		1.6	2.4	V	IF=1mA
			1.7			IF=5mA
			1.8			IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

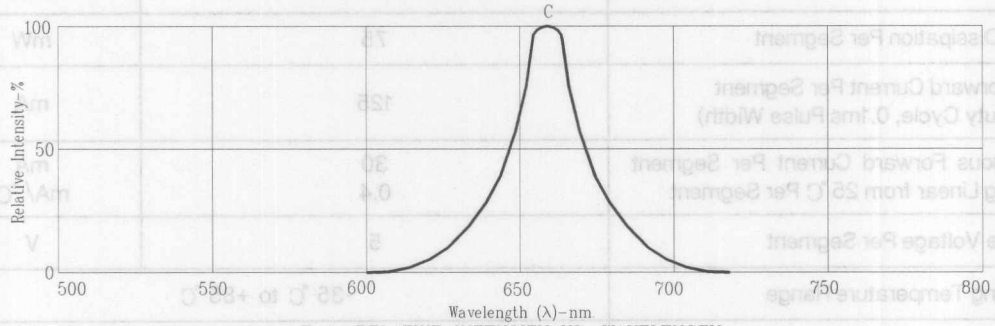


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

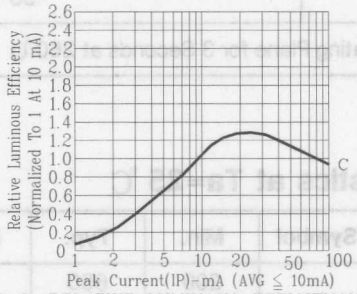


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

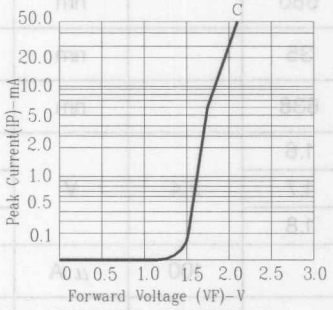


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

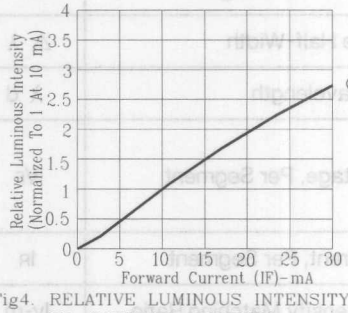


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

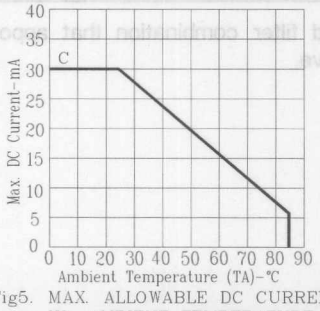


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

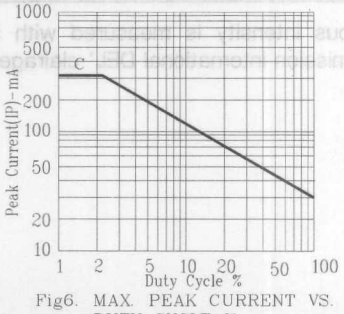


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: C=ULTRABRIGHT RED (REFRESH RATE 1KHz)

0.52" Low Current Red Numeric LED Displays

LTS-540AWC
LTD-5200WC Series
LTC-5300/5800WC

Features

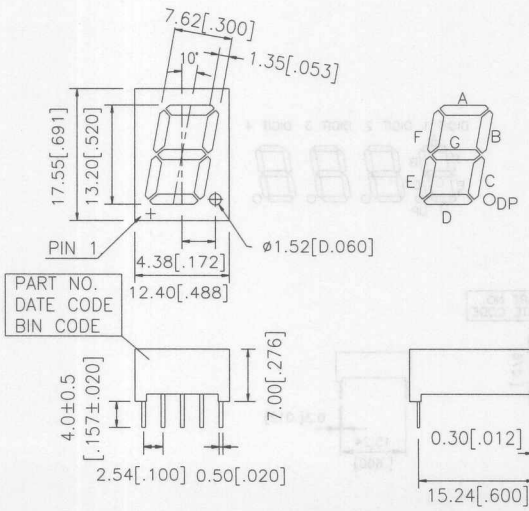
- 0.52 inch (13.2mm) digit height
- Continuous uniform segments.
- Low power consumption.
- Low power requirement.
- Excellent characters appearance.
- Solid state reliability.
- Wide viewing angle.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

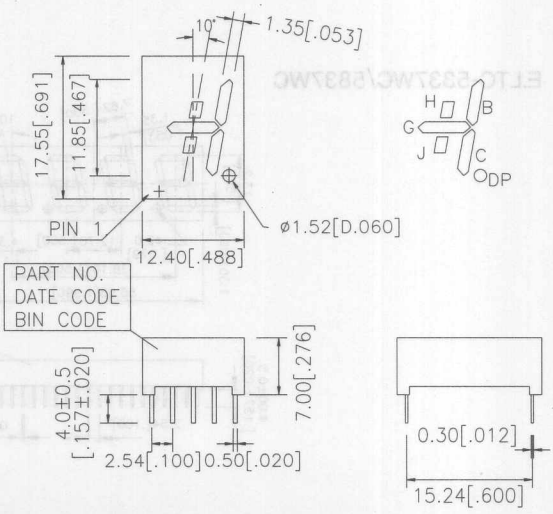
The LTS-540AWC, LTD-5200WC, LTC-5300/5800WC series are 0.52 inch (13.2mm) height seven segment displays. The low current red displays have gray face and white segments.
The low current red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate.
These low current seven segment displays are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current. Drive current as low as 1mA per segment is available.

Package Dimensions

A.LTS-546AWC/547AWC

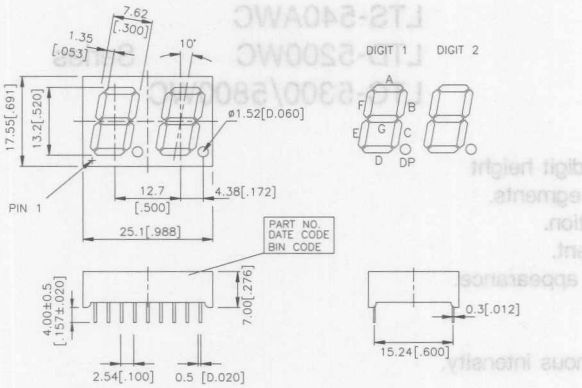


B.LTS-548AWC/549AWC

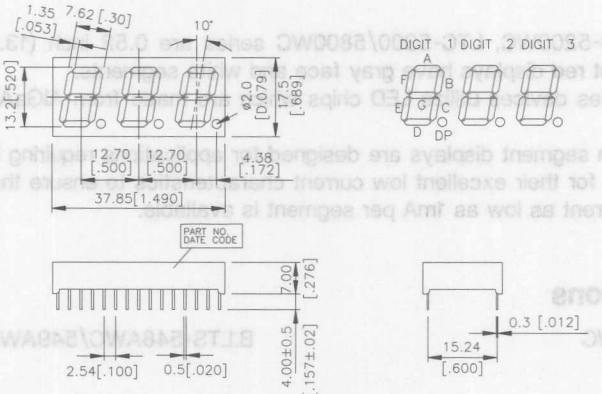


Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

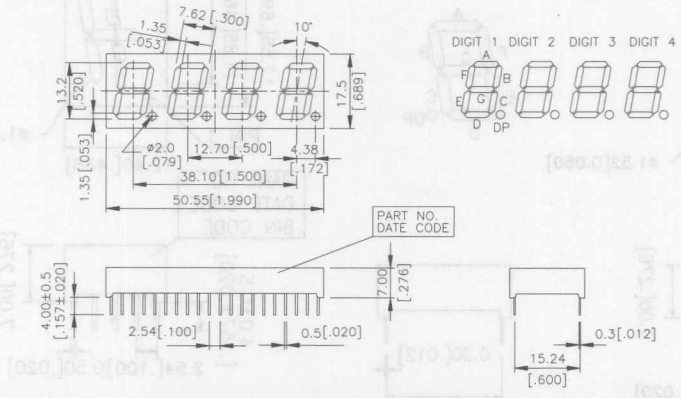
C.LTD-5250WC/5260WC



D.LTC-5336WC/5836WC



E.LTC-5337WC/5837WC



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

Devices

Part No. LTS- Low Current Red	Description	Package Dimension	Internal Circuit Diagram
546AWC	Common Anode, Rt. Hand Decimal	A	A
547AWC	Common Cathode, Rt. Hand Decimal	A	B
548AWC	Common Anode, ± 1 Overflow	B	C
549AWC	Common Cathode, ± 1 Overflow	B	D

Part No. LTD- Low Current Red	Description	Package Dimension	Internal Circuit Diagram
5250WC	Common Anode, Rt. Hand Decimal	C	E
5260WC	Common Cathode, Rt. Hand Decimal	C	F

Part No. LTC- Low Current Red	Description	Package Dimension	Internal Circuit Diagram
5336WC	Common Cathode, Rt. Hand Decimal	D	G
5836WC	Common Anode, Rt. Hand Decimal	D	H
5337WC	Common Cathode, Rt. Hand Decimal	E	I
5837WC	Common Anode, Rt. Hand Decimal	E	J

Pin Connection

Pin No.	Connection			
	A.LTS-546AWC	B.LTS-547AWC	C.LTS-548AWC	D.LTS-549AWC
1.	Cathode E	Anode E	Cathode J	Anode J
2.	Cathode D	Anode D	No Connection	No Connection
3.	Common Anode*	Common Cathode*	Common Anode*	Common Cathode*
4.	Cathode C	Anode C	Cathode C	Anode C
5.	Cathode D.P.	Anode D.P.	Cathode D.P.	Anode D.P.
6.	Cathode B	Anode B	Cathode B	Anode B
7.	Cathode A	Anode A	No Connection	No Connection
8.	Common Anode*	Common Cathode*	Common Anode*	Common Cathode*
9.	Cathode F	Anode F	Cathode H	Anode H
10.	Cathode G	Anode G	Cathode G	Anode G

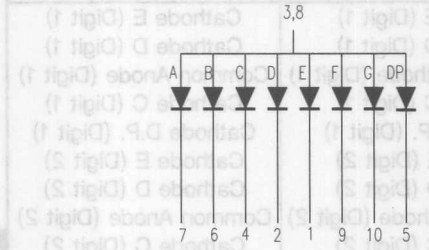
Note:*Pin 3 & 8 are internally connected.

Pin No.	Connection	
	E.LTD-5250WC	F.LTD-5260WC
1.	Cathode E (Digit 1)	Anode E (Digit 1)
2.	Cathode D (Digit 1)	Anode D (Digit 1)
3.	Cathode C (Digit 1)	Anode C (Digit 1)
4.	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)
5.	Cathode E (Digit 2)	Anode E (Digit 2)
6.	Cathode D (Digit 2)	Anode D (Digit 2)
7.	Cathode G (Digit 2)	Anode G (Digit 2)
8.	Cathode C (Digit 2)	Anode C (Digit 2)
9.	Cathode D.P. (Digit 2)	Anode D.P. (Digit 2)
10.	Cathode B (Digit 2)	Anode B (Digit 2)
11.	Cathode A (Digit 2)	Anode A (Digit 2)
12.	Cathode F (Digit 2)	Anode F (Digit 2)
13.	Common Anode (Digit 2)	Common Cathode (Digit 2)
14.	Common Anode (Digit 1)	Common Cathode (Digit 1)
15.	Cathode B (Digit 1)	Anode B (Digit 1)
16.	Cathode A (Digit 1)	Anode A (Digit 1)
17.	Cathode G (Digit 1)	Anode G (Digit 1)
18.	Cathode F (Digit 1)	Anode F (Digit 1)

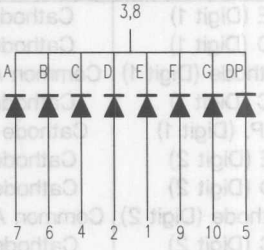
Pin No.	Connection			
	G.LTC-5336WC	H.LTD-5836WC	I.LTD-5337WC	J.LTD-5837WC
1.	Anode E (Digit 1)	Cathode E (Digit 1)	Anode E (Digit 1)	Cathode E (Digit 1)
2.	Anode D (Digit 1)	Cathode D (Digit 1)	Anode D (Digit 1)	Cathode D (Digit 1)
3.	Common Cathode (Digit 1)	Common Anode (Digit 1)	Common Cathode (Digit 1)	Common Anode (Digit 1)
4.	Anode C (Digit 1)	Cathode C (Digit 1)	Anode C (Digit 1)	Cathode C (Digit 1)
5.	Anode D.P. (Digit 1)	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)	Cathode D.P. (Digit 1)
6.	Anode E (Digit 2)	Cathode E (Digit 2)	Anode E (Digit 2)	Cathode E (Digit 2)
7.	Anode D (Digit 2)	Cathode D (Digit 2)	Anode D (Digit 2)	Cathode D (Digit 2)
8.	Common Cathode (Digit 2)	Common Anode (Digit 2)	Common Cathode (Digit 2)	Common Anode (Digit 2)
9.	Anode C (Digit 2)	Cathode C (Digit 2)	Anode C (Digit 2)	Cathode C (Digit 2)
10.	Anode D.P.(Digit 2)	Cathode D.P. (Digit 2)	Anode D.P.(Digit 2)	Cathode D.P. (Digit 2)
11.	Anode E (Digit 3)	Cathode E (Digit 3)	Anode E (Digit 3)	Cathode E (Digit 3)
12.	Anode D (Digit 3)	Cathode D (Digit 3)	Anode D (Digit 3)	Cathode D (Digit 3)
13.	Common Cathode (Digit 3)	Common Anode (Digit 3)	Common Cathode (Digit 3)	Common Anode (Digit 3)
14.	Anode C (Digit 3)	Cathode C (Digit 3)	Anode C (Digit 3)	Cathode C (Digit 3)
15.	Anode D.P. (Digit 3)	Cathode D.P. (Digit 3)	Anode D.P. (Digit 3)	Cathode D.P. (Digit 3)
16.	Anode B (Digit 3)	Cathode B (Digit 3)	Anode E (Digit 4)	Cathode E (Digit 4)
17.	Anode A (Digit 3)	Cathode A (Digit 3)	Anode D (Digit 4)	Cathode D (Digit 4)
18.	Common Cathode (Digit 3)	Common Anode (Digit 3)	Common Cathode (Digit 4)	Common Anode (Digit 4)
19.	Anode F (Digit 3)	Cathode F (Digit 3)	Anode C (Digit 4)	Cathode C (Digit 4)
20.	Anode G (Digit 3)	Cathode G (Digit 3)	Anode D.P. (Digit 4)	Cathode D.P. (Digit 4)
21.	Anode B (Digit 2)	Cathode B (Digit 3)	Anode B (Digit 4)	Cathode B (Digit 4)
22.	Anode A (Digit 2)	Cathode A (Digit 3)	Anode A (Digit 4)	Cathode A (Digit 4)
23.	Common Cathode (Digit 2)	Common Anode (Digit 2)	Common Cathode (Digit 4)	Common Anode (Digit 4)
24.	Anode F (Digit 2)	Cathode F (Digit 2)	Anode F (Digit 4)	Cathode F (Digit 4)
25.	Anode G (Digit 2)	Cathode G (Digit 2)	Anode G (Digit 4)	Cathode G (Digit 4)
26.	Anode B (Digit 1)	Cathode B (Digit 1)	Anode B (Digit 3)	Cathode B (Digit 3)
27.	Anode A (Digit 1)	Cathode A (Digit 1)	Anode A (Digit 3)	Cathode A (Digit 3)
28.	Common Cathode (Digit 1)	Common Anode (Digit 1)	Common Cathode (Digit 3)	Common Anode (Digit 3)
29.	Anode F (Digit 1)	Cathode F (Digit 1)	Anode F (Digit 3)	Cathode F (Digit 3)
30.	Anode G (Digit 1)	Cathode G (Digit 1)	Anode G (Digit 3)	Cathode G (Digit 3)
31.	-	-	Anode B (Digit 2)	Cathode B (Digit 2)
32.	-	-	Anode A (Digit 2)	Cathode A (Digit 2)
33.	-	-	Common Cathode (Digit 2)	Common Anode (Digit 2)
34.	-	-	Anode F (Digit 2)	Cathode F (Digit 2)
35.	-	-	Anode G (Digit 2)	Cathode G (Digit 2)
36.	-	-	Anode B (Digit 1)	Cathode B (Digit 1)
37.	-	-	Anode A (Digit 1)	Cathode A (Digit 1)
38.	-	-	Common Cathode (Digit 1)	Common Anode (Digit 1)
39.	-	-	Anode F (Digit 1)	Cathode F (Digit 1)
40.	-	-	Anode G (Digit 1)	Cathode G (Digit 1)

Internal Circuit Diagrams

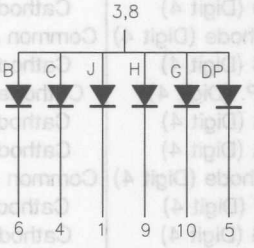
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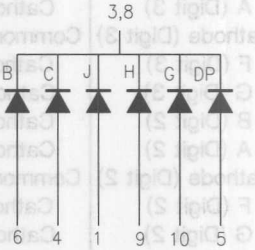
B.LTS-547AWC



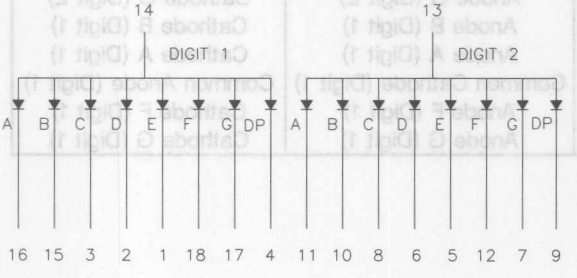
C.LTS-548AWC



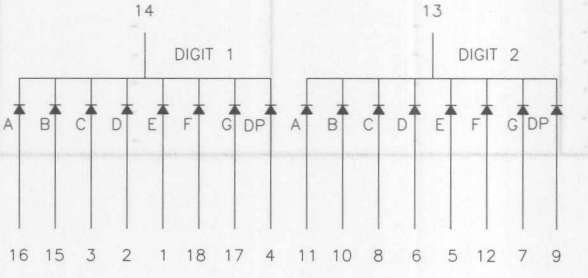
D.LTS-549AWC



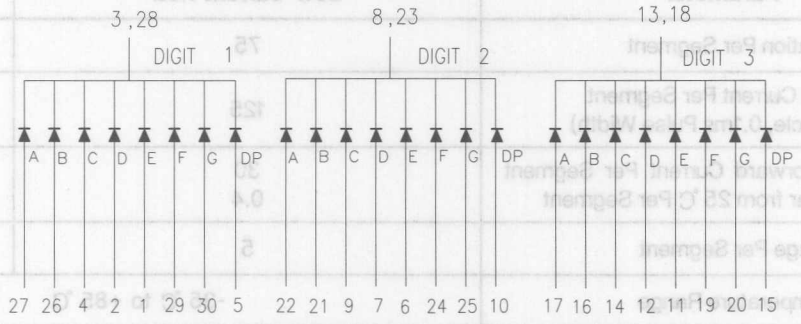
E.LTD-5250WC



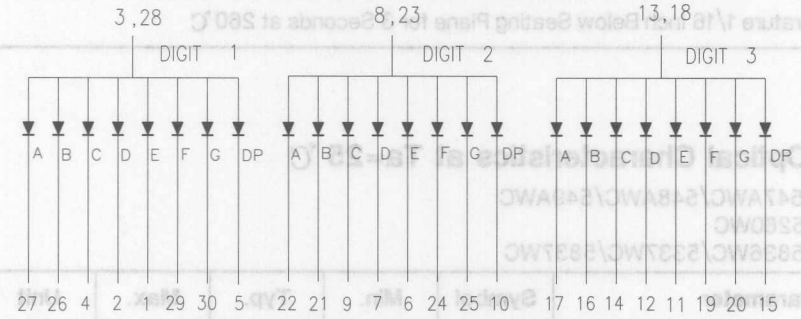
F.LTD-5260WC



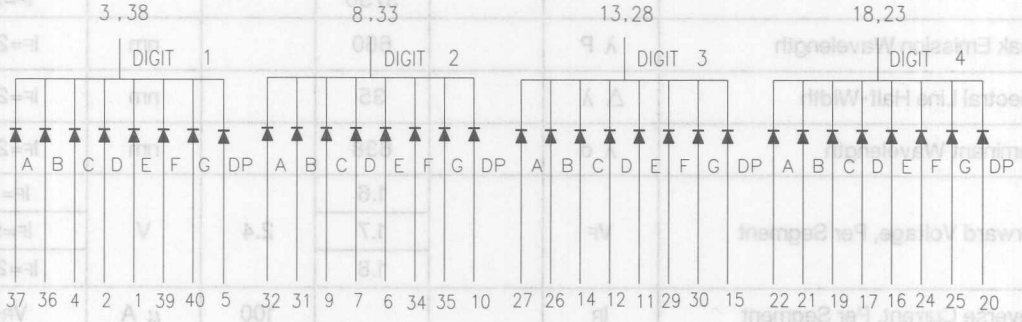
G.LTC-5336WC



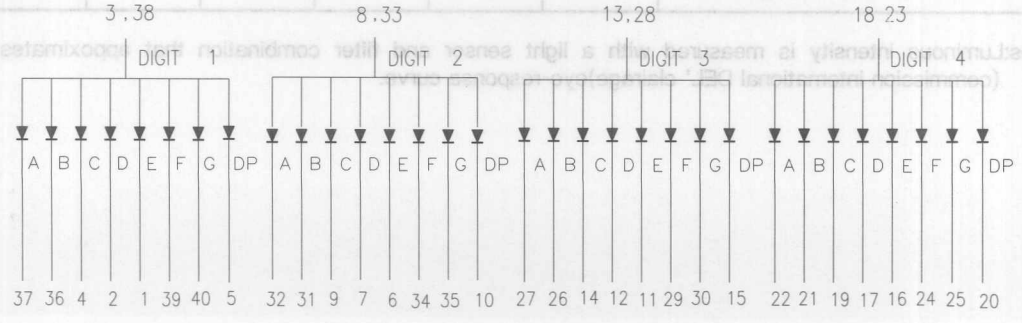
H.LTC-5836WC



I.LTC-5337WC



J.LTC-5837WC



Absolute Maximum Rating at Ta=25 ℃

Parameter	Low Current Red	Unit
Power Dissipation Per Segment	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	125	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	30 0.4	mA mA/ ℃
Reverse Voltage Per Segment	5	V
Operating Temperature Range	-35 ℃ to +85 ℃	
Stroage Temperature Range	-35 ℃ to +85 ℃	
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃		

Electrical/Optical Characteristics at Ta=25 ℃

LTS-546AWC/547AWC/548AWC/549AWC
LTD-5250WC/5260WC
LTS-5336WC/5836WC/5337WC/5837WC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	700		μ cd	IF=1mA
			3750			IF=5mA
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Segment	VF		1.6	2.4	V	IF=1mA
			1.7			IF=5mA
			1.8			IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

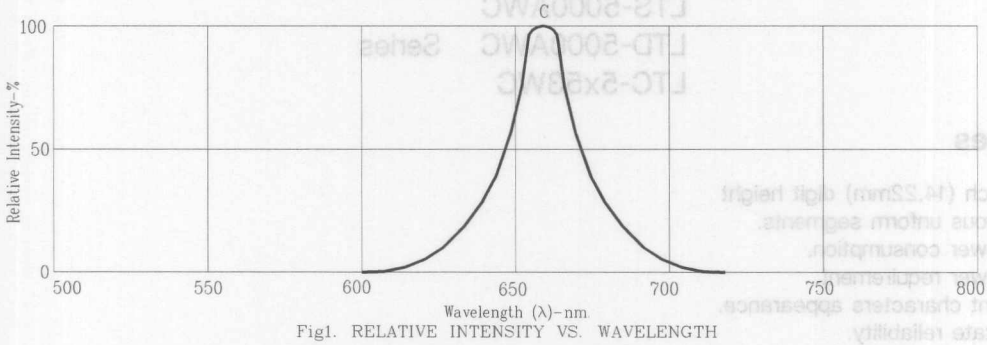


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

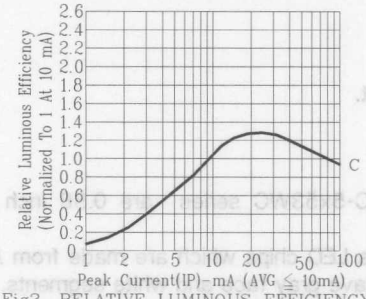


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

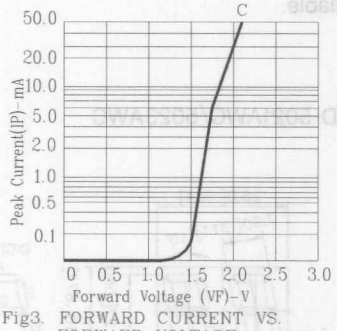


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

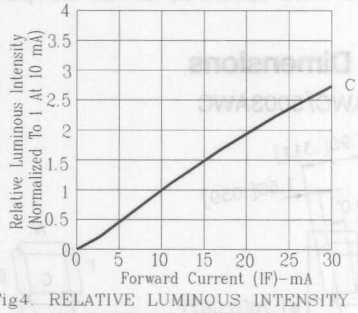


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

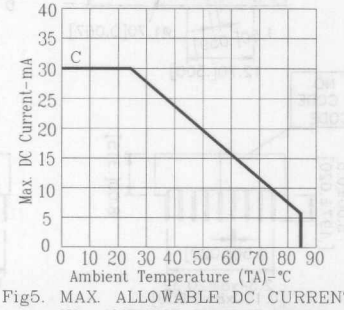


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

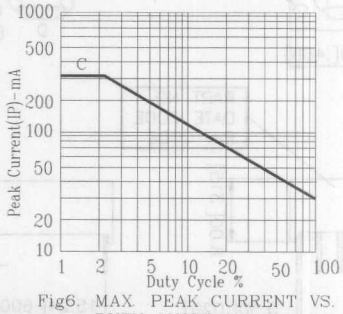


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: C=ULTRABRIGHT RED (REFRESH RATE 1KHz)

LITEON

0.56" Low Current Red Numeric LED Displays

LTS-5000AWC
LTD-5000AWC Series
LTC-5x53WC

Features

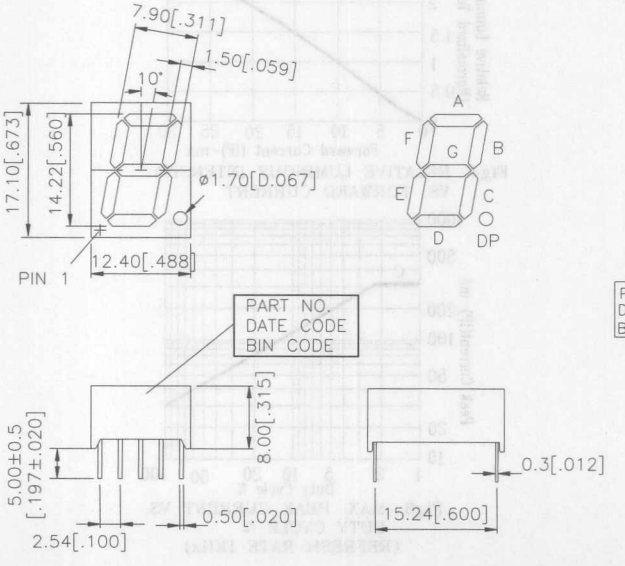
- 0.56 inch (14.22mm) digit height
- Continuous unform segments.
- Low power consumption.
- Low power requirement.
- Excellent characters appearance.
- Solid state reliability.
- Wide viewing angle.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

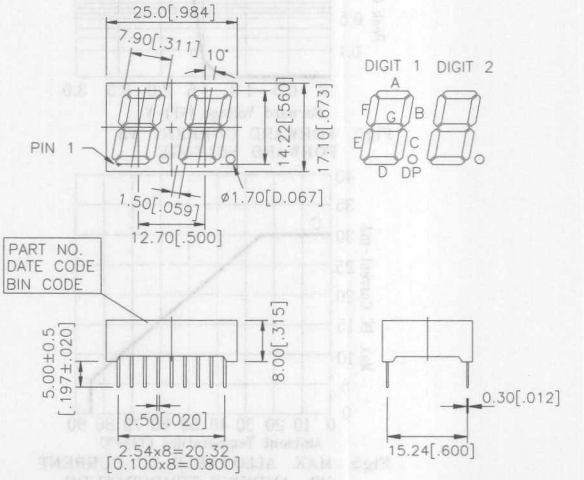
The LTS-5000AWC, LTD-5000AWC/LTC-5x53WC series are 0.56 inch (14.22mm) height seven segment single, dual and quadruple displays.
The low current red series device utilizes LED chips which are made from AlGaAs on a non-transparent GaAs substrate. The low current red displays have gray face and white segments.
These low current seven segment displays are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current. Drive current as low as 1mA per segment is available.

Package Dimensions

A.LTS-5001AWC/5003AWC

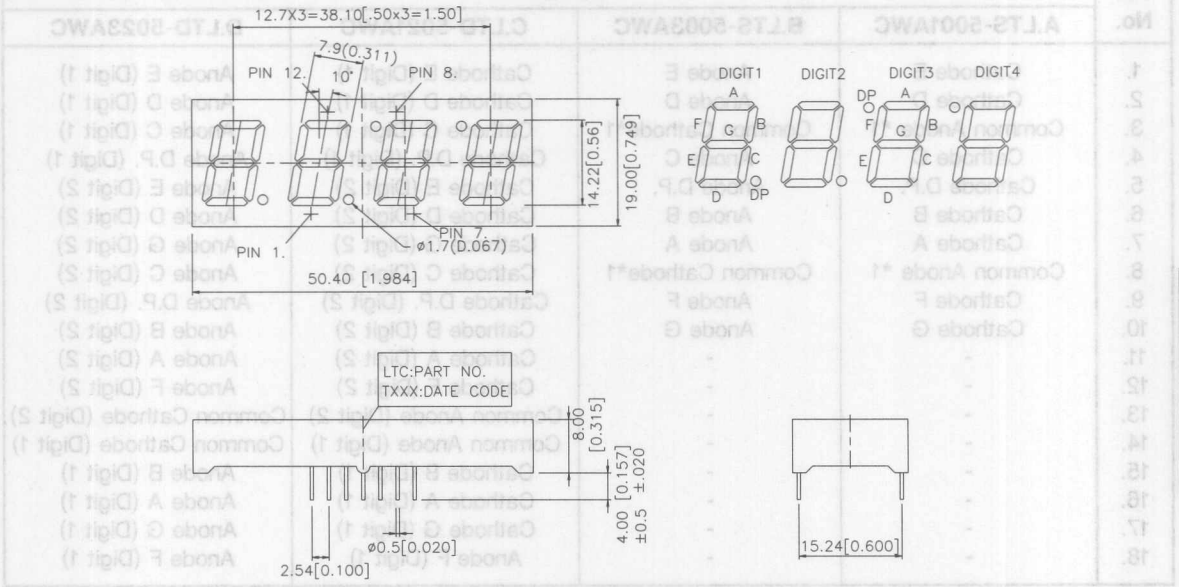


B.LTD-5021AWC/5023AWC



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

C.LTC-5653WC/5753WC



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

Devices

Part No. / Low Current Red	Description	Package Dimension	Internal Circuit Diagram
LTS-5001AWC	Common Anode, Rt. Hand Decimal	A	A
LTS-5003AWC	Common Cathode, Rt. Hand Decimal	A	B
LTD-5021AWC	Common Anode, Rt. Hand Decimal	B	C
LTD-5023AWC	Common Cathode, Rt. Hand Decimal	B	D
LTC-5653WC	Multiplex Common Anode	C	E
LTC-5753WC	Multiplex Common Cathode	C	F

Pin Connection

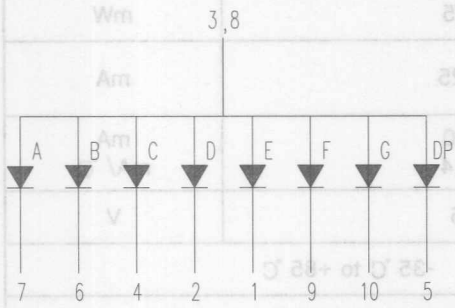
Pin No.	Connection			
	A.LTS-5001AWC	B.LTS-5003AWC	C.LTD-5021AWC	D.LTD-5023AWC
1.	Cathode E	Anode E	Cathode E (Digit 1)	Anode E (Digit 1)
2.	Cathode D	Anode D	Cathode D (Digit 1)	Anode D (Digit 1)
3.	Common Anode *1	Common Cathode*1	Cathode C (Digit 1)	Anode C (Digit 1)
4.	Cathode C	Anode C	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)
5.	Cathode D.P.	Anode D.P.	Cathode E (Digit 2)	Anode E (Digit 2)
6.	Cathode B	Anode B	Cathode D (Digit 2)	Anode D (Digit 2)
7.	Cathode A	Anode A	Cathode G (Digit 2)	Anode G (Digit 2)
8.	Common Anode *1	Common Cathode*1	Cathode C (Digit 2)	Anode C (Digit 2)
9.	Cathode F	Anode F	Cathode D.P. (Digit 2)	Anode D.P. (Digit 2)
10.	Cathode G	Anode G	Cathode B (Digit 2)	Anode B (Digit 2)
11.	-	-	Cathode A (Digit 2)	Anode A (Digit 2)
12.	-	-	Cathode F (Digit 2)	Anode F (Digit 2)
13.	-	-	Common Anode (Digit 2)	Common Cathode (Digit 2)
14.	-	-	Common Anode (Digit 1)	Common Cathode (Digit 1)
15.	-	-	Cathode B (Digit 1)	Anode B (Digit 1)
16.	-	-	Cathode A (Digit 1)	Anode A (Digit 1)
17.	-	-	Cathode G (Digit 1)	Anode G (Digit 1)
18.	-	-	Anode F (Digit 1)	Anode F (Digit 1)

Note:*Pin 3 & 8 are internally connected.

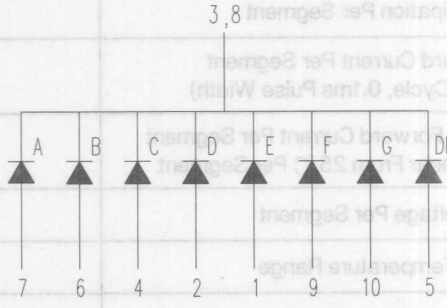
Pin No.	Connetcion	
	E.LTC-5653AWC	F.LTC-5753AWC
1.	Cathode E	Anode E
2.	Cathode D	Anode D
3.	Cathode D.P.	Anode D.P.
4.	Cathode C	Anode C
5.	Cathode G	Anode G
6.	Common Anode (Digit 4)	Common Cathode (Digit 4)
7.	Cathode B	Anode B
8.	Common Anode (Digit 3)	Common Cathode (Digit 3)
9.	Common Anode (Digit 2)	Common Cathode (Digit 2)
10.	Cathode F	Anode F
11.	Cathode A	Anode A
12.	Common Anode (Digit 1)	Common Cathode (Digit 1)

Internal Circuit Diagrams

A.LTS-5001AWC

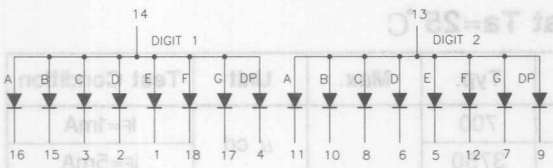


B.LTS-5003AWC

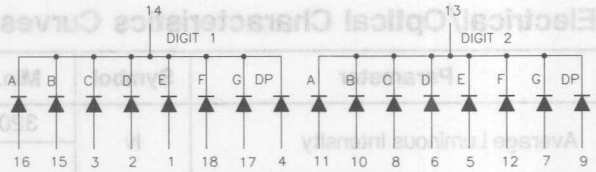


C.LTD-5021AWC

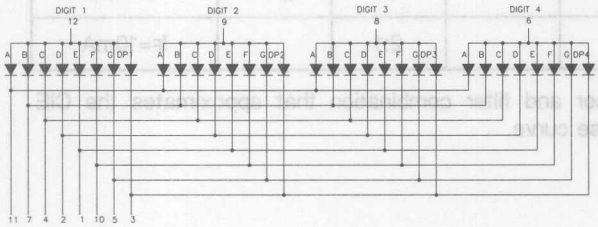
D.LTD-5023AWC

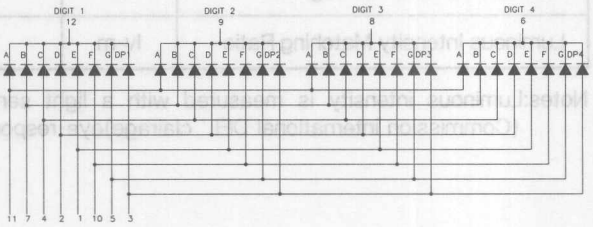


E.LTC-5653WC



F.LTC-5753WC





Absolute Maximum Rating at Ta=25 ℃

Parameter	Orange	Unit
Power Dissipation Per Segment	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	125	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	30 0.4	mA mA/ ℃
Reverse Voltage Per Segment	5	V
Operating Temperature Range	-35 ℃ to +85 ℃	
Stroage Temperature Range	-35 ℃ to +85 ℃	
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃		

Electrical/Optical Characteristics Curves at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	700		μ cd	IF=1mA
			3750			IF=5mA
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Segment	VF		1.6	2.4	V	IF=1mA
			1.7			IF=5mA
			1.8			IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Note)

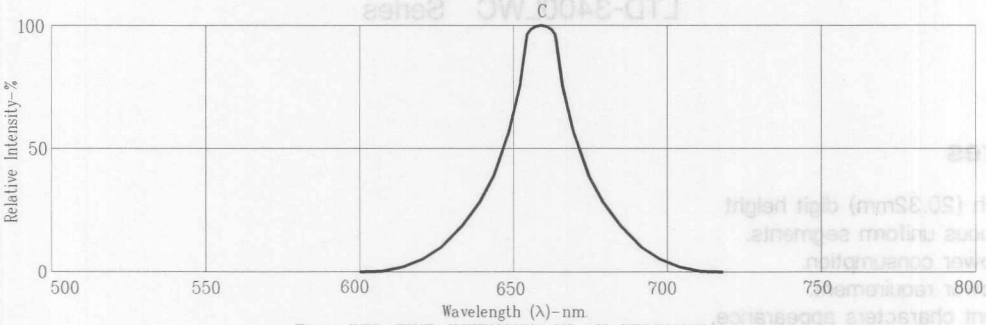


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

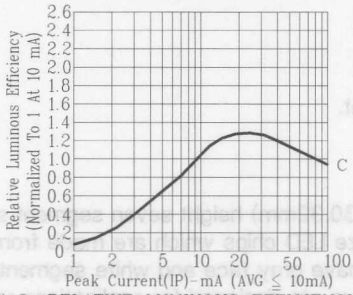


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

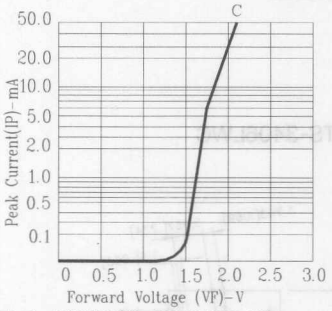


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

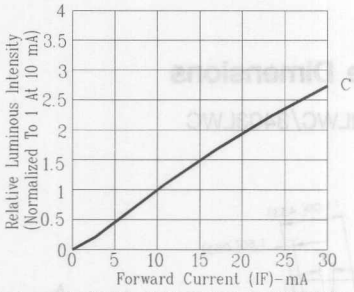


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

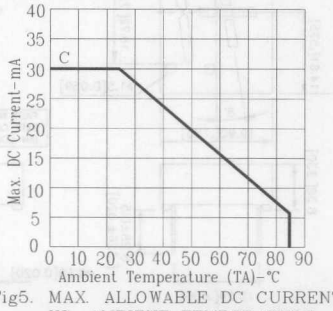


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

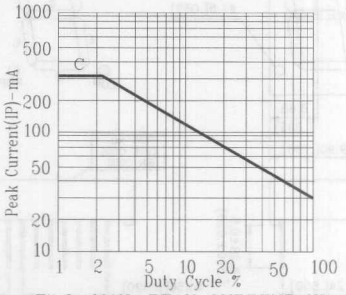


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: C=ULTRABRIGHT RED (REFRESH RATE 1KHz)

0.8" Low Current Red Single Digit Numeric LED Displays

LTD-3400LWC Series

Features

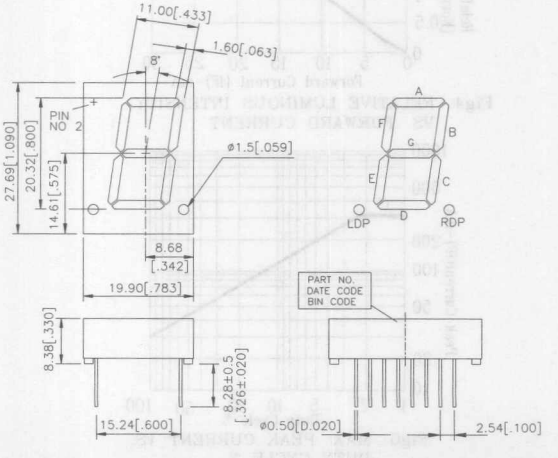
- 0.8 inch (20.32mm) digit height
- Continuous uniform segments.
- Low power consumption.
- Low power requirement.
- Excellent characters appearance.
- Solid state reliability.
- Wide viewing angle.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

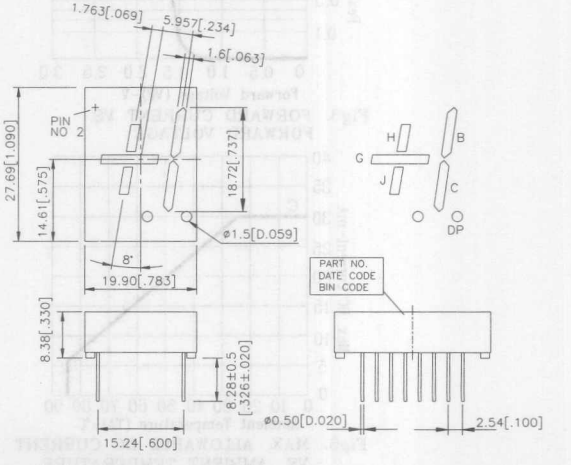
The LTS-3400LWC series are 0.8 inch (30.32mm) height seven segment single digit displays.
The low current red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate. The low current red displays have gray face and white segments.
These low current seven segment displays are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current.Drive current as low as 1 mA per segment is available.

Package Dimensions

A.LTS-3401LWC/3403LWC



B.LTS-3406LWC



 Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (± 0.01") unless otherwise noted.

Devices

Part No.LTS- Low Current Red	Description	Package Dimension	Internal Circuit Diagram
3401ILWC	Common Anode, Rt.& Lt. Hand Decimal	A	A
3403LWC	Common Cathode, Rt.& Lt. Hand Decimal	A	B
3406LWC	Universal, ± 1 Overflow, Rt Hand Decimal	B	C

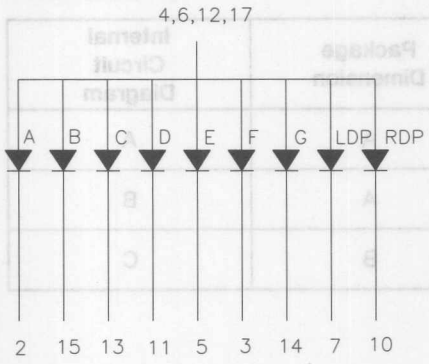
Pin Connection

Pin No.	Connection		
	A.LTS-3401LWC	B.LTS-3403LWC	C.LTS-3406LWC
1.	No Pin	No Pin	No Pin
2.	Cathode A	Anode A	Cathode B *2
3.	Cathode F	Anode F	Anode H
4.	Common Anode *1	Common Cathode *1	Cathode H
5.	Cathode E	Anode E	Cathode G
6.	Common Anode *1	Common Cathode *1	Cathode J
7.	Cathode L.D.P	Anode L.D.P	Anode J
8.	No Pin	No Pin	Cathode D.P. *3
9.	No Pin	No Pin	No Pin
10.	Cathode R.D.P	Anode R.D.P	Anode D.P
11.	Cathode D	Anode D	Cathode D.P.*3
12.	Common Anode *1	Common Cathode *1	Cathode C
13.	Cathode C	Anode C	Anode C
14.	Cathode G	Anode G	Anode G
15.	Cathode B	Anode B	Anode B
16.	No Pin	No Pin	No Pin
17.	Common Anode*1	Common Cathode *1	Cathode B*2

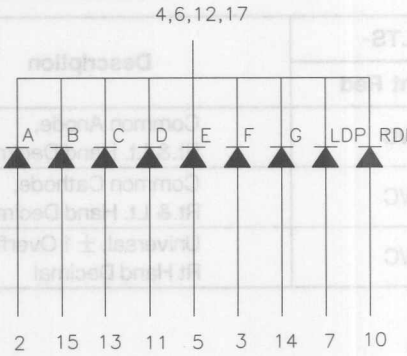
NOTES:1.Pin 4,6,12&17 are internally connected.
2.Pin 2 & 17 are internally connected.
3.Pin 8 & 11 are internally connected.

Internal Circuit Diagrams

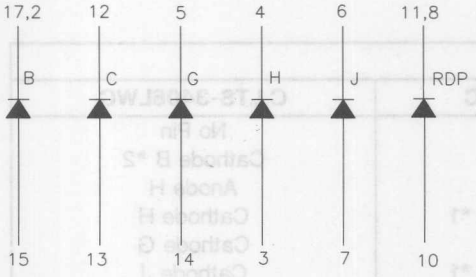
A.LTS-3401LWC



B.LTS-3403LWC



C.LTD-3406LWC



Absolute Maximum Rating at Ta=25 ℃

Parameter	Low Current Red	Unit
Power Dissipation Per Segment	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	125	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	30 0.4	mA mA/ ℃
Reverse Voltage Per Segment	5	V
Operating Temperature Range	-35 ℃ to +85 ℃	
Stroage Temperature Range	-35 ℃ to +85 ℃	
Solder Temperature 1/16 Inch Below Seating Plane for 3 SecondS at 260 ℃		

Electrical/Optical Characteristics at Ta=25 ℃

LTS-3401LWC/3403LWC/3406LWC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	700		μ cd	IF=1mA
			3750			IF=5mA
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Segment	VF		1.6	2.4	V	IF=1mA
			1.7			IF=5mA
			1.8			IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission imternatioral DEL clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

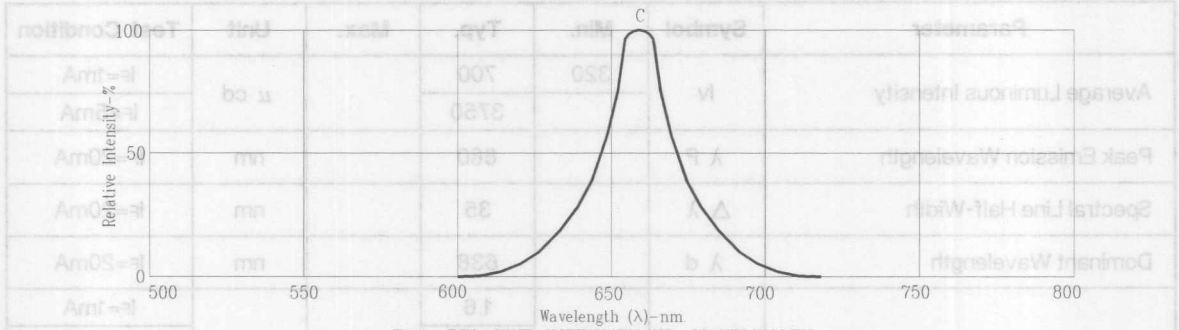


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

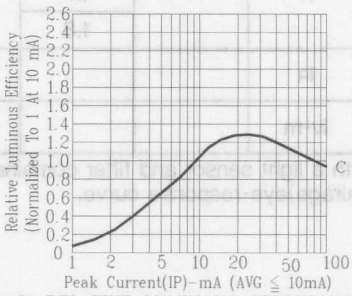


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

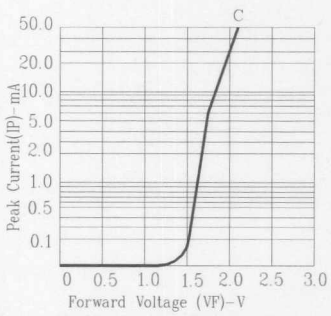


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

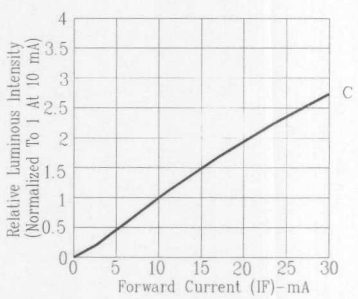


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

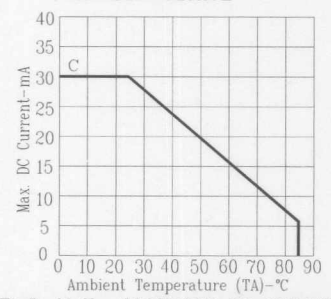


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

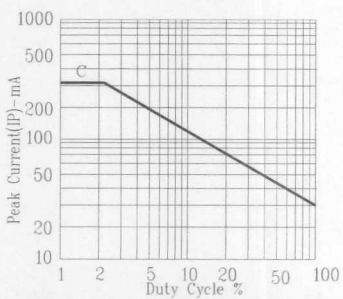


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: C=ULTRABRIGHT RED (REFRESH RATE 1KHz)

1.0" Low Current Red Single Digit Numeric LED Displays

LTS-10000WC Series

Features

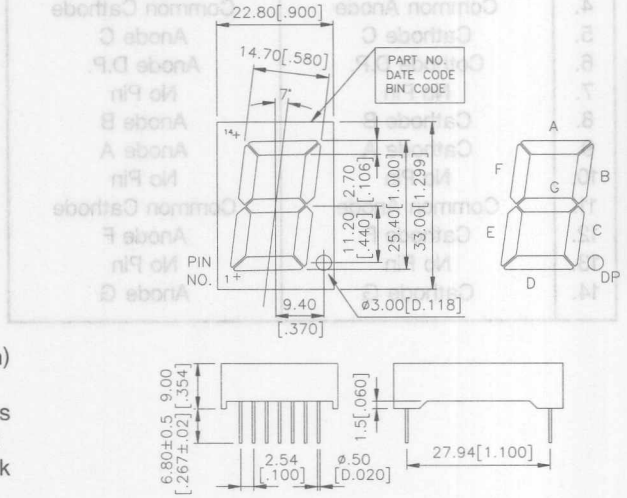
- 1.0 inch (25.4mm) digit height.
- Continuous uniform segments.
- Low power consumption.
- Low power requirement.
- Excellent characters appearance.
- Solid state reliability.
- Wide viewing angle.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

The LTS-10000WC series are 1.0 inch (25.4mm) height seven segment single digit displays.
The low current red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate. Low current red displays have black face and white segments.
The low current seven segment displays are designed for applications requiring low power consumption.
They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current. Drive current as low as 1mA per segment is available.

Package Dimensions

LTS-10304WC/10804WC



Notes: All dimensions are in millimeters (inches).
Tolerance : ± 0.25mm (± 0.01") unless otherwise noted.

Devices

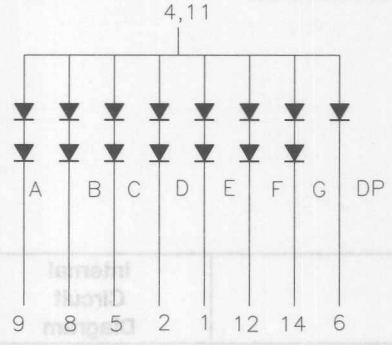
Part No.LTS- Low Current Red	Description	Internal Circuit Diagram
10804WC	Common Anode, Rt. Hand Decimal	A
10304WC	Common Cathode, Rt. Hand Decimal	B

Pin Connection

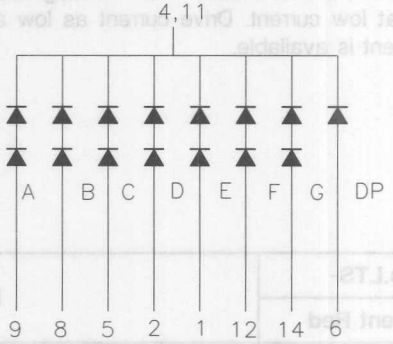
Pin No.	Connection	
	A.LTS-10804WC	B.LTS-10304WC
1.	Cathode E	Anode E
2.	Cathode D	Anode D
3.	No Pin	No Pin
4.	Common Anode	Common Cathode
5.	Cathode C	Anode C
6.	Cothode D.P.	Anode D.P.
7.	No Pin	No Pin
8.	Cathode B	Anode B
9.	Cathode A	Anode A
10.	No Pin	No Pin
11.	Common Anode	Common Cathode
12.	Cathode F	Anode F
13.	No Pin	No Pin
14.	Cathode G	Anode G

Internal Circuit Diagrams

A.LTS-10804WC



B.LTC-10304WC



Absolute Maximum Rating at Ta=25 ℃

Parameter	Low Current Red	Unit
Power Dissipation Per Segment	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	125	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	30 0.4	mA mA/ ℃
Reverse Voltage Per Segment	10	V
Operating Temperature Range	-35 ℃ to +85 ℃	
Stroage Temperature Range	-35 ℃ to +85 ℃	
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃		

Electrical/Optical Characteristics at Ta=25 ℃

LTS-10304WC/10804WC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	500	1200		μ cd	IF=1mA
			7500			IF=5mA
Peak Emission Wavelength	λ P		660		nm	IF=20mA
Spectrial Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, Per Segment	VF		3.2(1.6)	4.8(2.4)	V	IF=1mA
			3.4(1.7)			IF=5mA
			3.6(1.8)			IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

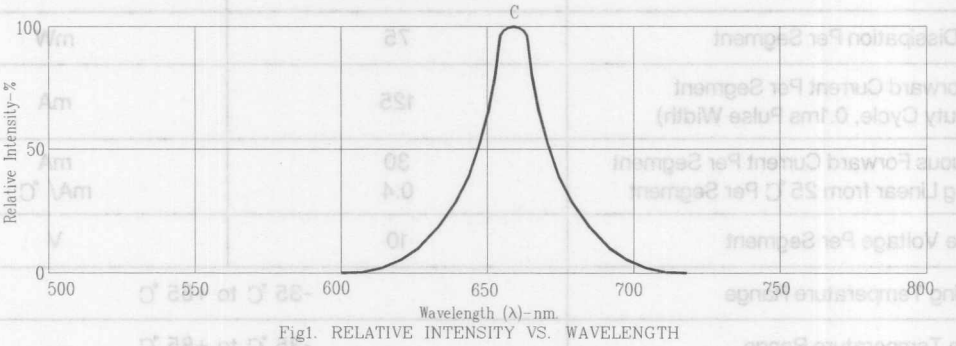


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

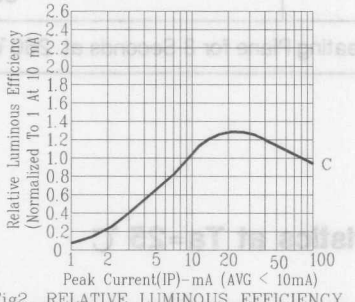


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

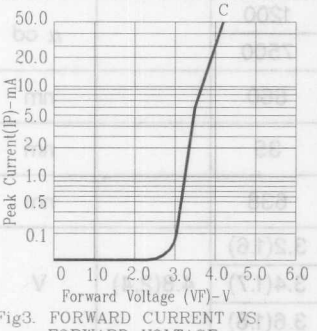


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

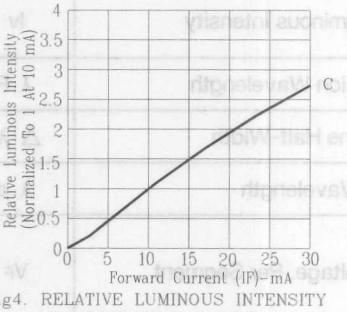


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

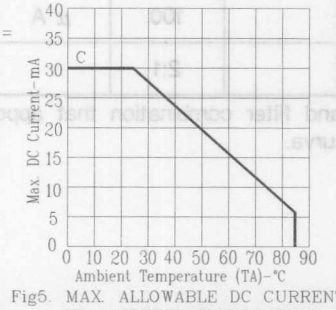


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

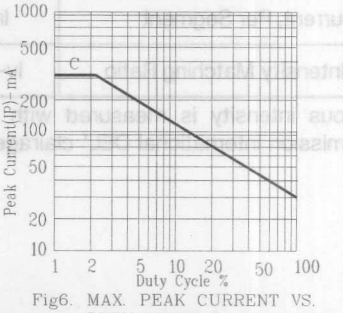


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: C=ULTRABRIGHT RED (REFRESH RATE 1KHz)

14. SEVEN-SEGMENT LED DISPLAYS

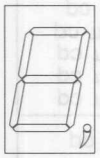
- SELECTION GUIDE 14-1
- CROSS REFERENCE GUIDE 14-11
- SINGLE COLOR ULTRA LARGE SEVEN-SEGMENT LED DISPLAYS 14-21
- MULTICOLOR ULTRA LARGE SEVEN-SEGMENT LED DISPLAYS 14-21
- SINGLE DIGIT NUMERIC LED DISPLAYS 14-27
- DUAL DIGIT NUMERIC LED DISPLAYS 14-27
- THREE-DIGIT NUMERIC LED DISPLAYS 14-27
- FOUR-DIGIT NUMERIC LED DISPLAYS 14-27

14. SEVEN-SEGMENT LED DISPLAYS

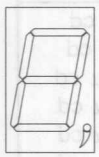
- SELECTION GUIDE 14-1
- CROSS REFERENCE GUIDE 14-11
- SINGLE COLOR ULTRALARGE SEVEN-SEGMENT LED DISPLAYS 14-21
- MULTICOLOR ULTRALARGE SEVEN-SEGMENT LED DISPLAYS 14-21
- SINGLE DIGIT NUMERIC LED DISPLAYS 14-27
- DUAL DIGIT NUMERIC LED DISPLAYS 14-27
- THREE-DIGIT NUMERIC LED DISPLAYS 14-27
- FOUR-DIGIT NUMERIC LED DISPLAYS 14-27

Selection Guide

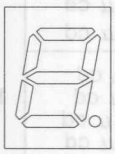
· Single Color Ultralarge Seven-Segment LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @IF=30mA	Page No.
 127.0mm (5.0") Dual-In-Line 7.1"H × 4.3"W × .629"D	LTS- 50301G 50301HRB	Green (565 nm) Hi.-Eff.Red (635 nm)	Common Cathode, Rt.Hand Decimal & Comma	60 mcd 60 mcd	14-21
	50801G 50801HRB	Green (565 nm) Hi.-Eff.Red (635 nm)	Common Anode, Rt.Hand Decimal & Comma	60 mcd 60 mcd	14-21

· Multicolor Ultralarge Seven-Segment LED Displays

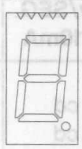
Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @IF=20mA	Page No.
 127.0mm (5.0") Dual-In-Line 7.1"H × 4.3"W × .629"D	LTS- 50302A	Green (565 nm) & Orange (630 nm)	Common Cathode, Rt.Hand Decimal & Comma	40 mcd	14-21
	50802A	Green (565 nm) & Orange (630 nm)	Common Anode, Rt.Hand Decimal & Comma	40 mcd	14-21

· Single Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @IF=10mA	Page No.
 7mm (.28") Dual-In-Line .39"H × .29"W × .24"D	LTS- 2301AR 2301AP 2301AG 2301AY 2301AE	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Cathode, Rt.Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	14-27
	2801AR 2801AP 2801AG 2801AY 2801AE	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Anode, Rt.Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	14-27

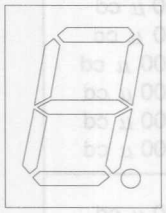
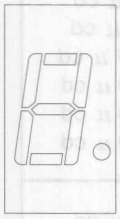
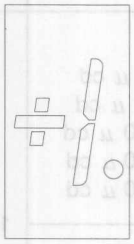
Selection Guide

· Single Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @IF=10mA	Page No.
 7.62mm(.3") Dual-In-Line .74"H × .39"W × .2"D	LTS- 311AR 311AP 311AG 311AY 311AE 311AHR	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Universal, ± 1 Overflow	 500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	14-36
	312AR 312AP 312AG 312AY 312AE 312AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Anode, Rt.&Lt.Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	
	313AR 313AP 313AG 313AY 313AE 313AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Cathode, Rt.Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	
	315AR 315AP 315AG 315AY 315AE 315AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Cathode, Rt.Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	
	316AR 316AP 316AG 316AY 316AE 316AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Anode, ± 1 Overflow	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	
  9.20mm(.36") Dual-In-Line .56"H × .26"W × .34"D	LTS- 360R	 Red (655 nm)		 500 μ cd	14-47
	360P 360G 360E 360HR	Bright Red (697 nm) Green (565 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Anode, Rt.Hand Decimal	750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	
	367R 367P 367G 367E 367HR	Red (655nm) Bright Red (697 nm) Green (565 nm) Orange (630 nm) Hi.-Eff.Red (635 nm)	Common Cathode, Rt.Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	
	368R 368P 368G 368E 368HR	Red (655nm) Bright Red (697 nm) Green (565 nm) Orange (630nm) Hi.-Eff.Red (635 nm)	Common Cathode, ± 1 Overflow	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	

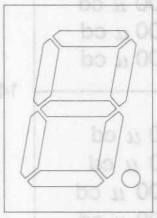
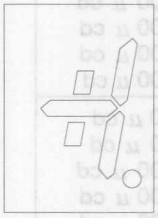
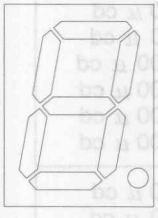
Selection Guide

· Single Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @I_F=10mA	Page No.
 10.0mm(.4") Dual-In-Line .5"H × .38"W × .27"D	LTS- 4301R 4301P 4301G 4301Y 4301E	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Cathode, Rt.Hand Decimal	 500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	14-53
	4801R 4801P 4801G 4801Y 4801E	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Anode, Rt.Hand Decimal	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	
	LTS- 4705AR 4705AP 4505AG 4805AY 4605AE 4905AHR	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635 nm)	Universal, ±1 Overflow	 500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	14-62
	4710AR 4710AP 4510AG 4810AY 4610AE 4910AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635 nm)	Common Anode, Rt. Hand Decimal	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	
	4730AR 4730AP 4530AG 4830AY 4630AE 4930AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635 nm)	Common Anode, ±1 Overflow	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	
	4740AR 4740AP 4540AG 4840AY 4640AE 4940AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635 nm)	Common Cathode, Rt.Hand Decimal	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	
10.16mm(.4") Dual-In-Line .74"H × .39"W × .2"D	4780AR 4780AP 4580AG 4880AY 4680AE 4980AHR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635 nm)	Common Cathode, Rt.Hand Decimal	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	

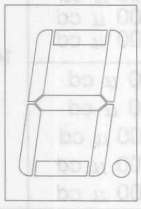
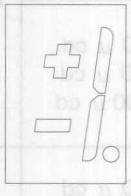
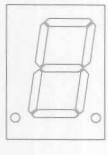
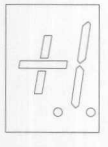
Selection Guide

· Single Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @I_F=10mA	Page No.
 13.2mm(.52") Dual-In-Line .7"H × .49"W × .28"D	LTS-				14-73
	546AR	Red (655 nm)	Common Anode, Rt.Hand Decimal	500 μ cd	
	546AP	Bright Red (697 nm)		800 μ cd	
	546AG	Green (565 nm)		2000 μ cd	
	546AY	Yellow (585 nm)		2000 μ cd	
	546AE	Orange (630 nm)		2000 μ cd	
	546AHR	Hi.-Eff.Red(635 nm)		2000 μ cd	
	547AR	Red (655 nm)	Common Cathode, Rt. Hand Decimal	500 μ cd	
	547AP	Bright Red (697 nm)		800 μ cd	
	547AG	Green (565 nm)		2000 μ cd	
	547AY	Yellow (585 nm)		2000 μ cd	
	547AE	Orange (630 nm)		2000 μ cd	
	547AHR	Hi.-Eff.Red(635 nm)		2000 μ cd	
	548AR	Red (655 nm)	Common Anode, ± 1 Overflow	500 μ cd	
	548AP	Bright Red (697 nm)		800 μ cd	
	548AG	Green (565 nm)		2000 μ cd	
	548AY	Yellow (585 nm)		2000 μ cd	
	548AE	Orange (630 nm)		2000 μ cd	
	548AHR	Hi.-Eff.Red(635 nm)		2000 μ cd	
	549AR	Red (655 nm)	Common Cathode, ± 1 Overflow	500 μ cd	
	549AP	Bright Red (697 nm)		800 μ cd	
	549AG	Green (565 nm)		2000 μ cd	
	549AY	Yellow (585 nm)		2000 μ cd	
	549AE	Orange (630 nm)		2000 μ cd	
	549AHR	Hi.-Eff.Red(635 nm)		2000 μ cd	
 14.22mm(.56") Dual-In-Line .67"H × .49"W × .32"D	LTS-				14-83
	5301AR	Red (655 nm)	Common Anode, Rt.Hand Decimal	600 μ cd	
	5301AP	Bright Red (697 nm)		950 μ cd	
	5601AG	Green (565 nm)		2400 μ cd	
	5701AY	Yellow (585 nm)		2400 μ cd	
	5501AE	Orange (630 nm)		2400 μ cd	
	5303AR	Red (655 nm)	Common Cathode, Rt.Hand Decimal	600 μ cd	
	5303AP	Bright Red (697 nm)		950 μ cd	
	5603AG	Green (565 nm)		2400 μ cd	
	5703AY	Yellow (585 nm)		2400 μ cd	
	5503AE	Orange (630 nm)		2400 μ cd	

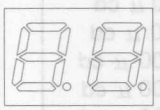
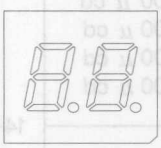
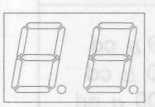
Selection Guide

· Single Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @IF=10mA	Page No.
	LTS- 6760R 6760P 6460G 6860Y 6660E 6960HR	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Anode, Rt. Hand Decimal	 600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	14-90
	6780R 6780P 6480G 6880Y 6680E 6980HR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Cathode, Rt. Hand Decimal	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	
	6775R 6775P 6475G 6875Y 6675E 6975HR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Anode, ± 1 Overflow	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	
	6795R 6795P 6495G 6895Y 6695E 6995HR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red(635nm)	Common Cathode, ± 1 Overflow	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	
14.22mm(.56") Dual-In-Line .75"H × .5"W × .32"D					
	LTS- 3401LR 3401LP 3401LG 3401LY 3401LE	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Anode, Rt.&Lt.Hand Decimal	 600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	14-100
	3403LR 3403LP 3403LG 3403LY 3403LE	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Cathode, Rt.&Lt.Hand Decimal	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	
	3406LR 3406LP 3406LG 3406LY 3406LE	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Universal, ± 1 Overflow	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	
20.32mm(.8") Dual-In-Line 1.09"H × .79"W × .33"D					

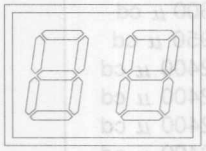
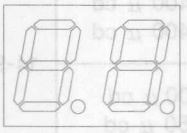
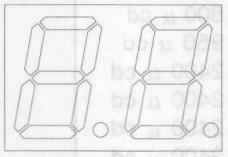
Selection Guide

· Dual Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @I_F=10mA	Page No.
 7.0mm (.28") Dual-In-Line .39"H × .59"W × .24"D	LTD-2601R	Red (655 nm)	Dualplex Common Anode, Rt. Hand Decimal	500 μ cd	14-27
	2601P	Bright Red (697 nm)		750 μ cd	
	2601G	Green (565 nm)		2000 μ cd	
	2601Y	Yellow (585 nm)		2000 μ cd	
	2601E	Orange (630 nm)		2000 μ cd	
	2701R	Red (655 nm)	Dualplex Common Cathode, Rt. Hand Decimal	500 μ cd	
	2701P	Bright Red (697 nm)		750 μ cd	
	2701G	Green (565 nm)		2000 μ cd	
	2701Y	Yellow (585 nm)		2000 μ cd	
	2701E	Orange (630 nm)		2000 μ cd	
 7.62mm (.3") Dual-In-Line .59"H × .62"W × .29"D	LTD-322R	Red (655 nm)	Dualplex Common Cathode, Rt. Hand Decimal	400 μ cd	14-42
	322P	Bright Red (697 nm)		650 μ cd	
	322G	Green (565 nm)		1600 μ cd	
	323R	Red (655 nm)	Dualplex Common Anode, Rt. Hand Decimal	400 μ cd	
	323P	Bright Red (697 nm)		650 μ cd	
	323G	Green (565 nm)		1600 μ cd	
 10.0mm (.4") Dual-In-Line .5"H × 1.58"W × .28"D	LTD-4608R	Red (655 nm)	Dualplex Common Anode, Rt. Hand Decimal	500 μ cd	14-53
	4608P	Bright Red (697 nm)		800 μ cd	
	4608G	Green (565 nm)		2200 μ cd	
	4608Y	Yellow (585 nm)		2200 μ cd	
	4608E	Orange (630 nm)		2200 μ cd	
	4708R	Red (655 nm)	Dualplex Common Cathode, Rt. Hand Decimal	500 μ cd	
	4708P	Bright Red (697 nm)		800 μ cd	
	4708G	Green (565 nm)		2200 μ cd	
	4708Y	Yellow (585 nm)		2200 μ cd	
	4708E	Orange (630 nm)		2200 μ cd	

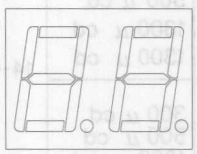
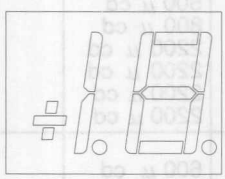
Selection Guide

· Dual Digit Numeric LED Displays

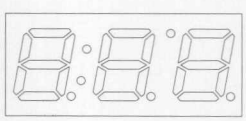
Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @IF=10mA	Page No.
 10.21mm (.4") Dual-In-Line .63"H × .87"W × .32"D	LTD- 432RC 432PC 432GC 432EC	 Red(655 nm) Bright Red (697 nm) Green(565nm) Orange (630 nm)	Common Cathode,	 300 μ cd 500 μ cd 1300 μ cd 1300 μ cd	14-68
	482RC 482PC 482GC 482EC	Red (655 nm) Bright Red (697 nm) Green (565 nm) Orange (630 nm)	Common Anode,	300 μ cd 500 μ cd 1300 μ cd 1300 μ cd	
 13.2mm (.52") Dual-In-Line .69"H × .99"W × .28"D	LTD- 5250R 5250P 5250G 5250Y 5250E 5250HR	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red (635 nm)	Common Anode, Rt. Hand Decimal	 500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	14-73
	5260R 5260P 5260G 5260Y 5260E 5260HR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red (635 nm)	Common Cathode, Rt. Hand Decimal	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	
 14.2mm (.56") Dual-In-Line .67"H × .98"W × .32"D	LTD- 5321AR 5321AP 5621AG 5721AY 5521AE	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Anode, Rt. Hand Decimal	 600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	14-83
	5323AR 5323AP 5623AG 5723AY 5523AE	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Cathode, Rt. Hand Decimal	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	

Selection Guide

· Dual Digit Numeric LED Displays

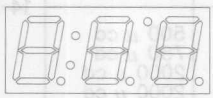
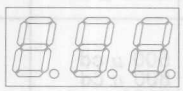
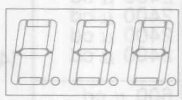
Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @I_F=10mA	Page No.
	LTD-				14-90
	6710R	Red (655 nm)	Common Anode, Rt. Hand Decimal	600 μ cd	
	6710P	Bright Red (697 nm)		950 μ cd	
	6410G	Green (565 nm)		2400 μ cd	
	6810Y	Yellow (585 nm)		2400 μ cd	
	6610E	Orange (630 nm)		2400 μ cd	
	6910HR	Hi.-Eff.Red (635 nm)		2400 μ cd	
	6730R	Red (655 nm)	Common Anode, Rt. Hand Decimal	600 μ cd	
	6730P	Bright Red (697 nm)		950 μ cd	
	6430G	Green (565 nm)		2400 μ cd	
	6830Y	Yellow (585 nm)		2400 μ cd	
	6630E	Orange (630 nm)		2400 μ cd	
	6930HR	Hi.-Eff.Red (635 nm)		2400 μ cd	
	6740R	Red (655 nm)	Common Cathode, Rt. Hand Decimal	600 μ cd	
	6740P	Bright Red (697 nm)		950 μ cd	
	6440G	Green (565 nm)		2400 μ cd	
	6840Y	Yellow (585 nm)		2400 μ cd	
	6640E	Orange (630 nm)		2400 μ cd	
	6940HR	Hi.-Eff.Red (635 nm)		2400 μ cd	
	6750R	Red (655 nm)	Common Cathode, Rt. Hand Decimal	600 μ cd	
	6750P	Bright Red (697 nm)		950 μ cd	
	6450G	Green (565 nm)		2400 μ cd	
	6850Y	Yellow (585 nm)		2400 μ cd	
	6650E	Orange (630 nm)		2400 μ cd	
14.22mm (.56") Dual-In-Line .75"H × .98"W × .32"D	6950HR	Hi.-Eff.Red (635 nm)		2400 μ cd	

· Three-Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @I_F=10mA	Page No.
	LTC-				14-27
	2621R	Red (655 nm)	Multiplex Common Anode Rt. Hand Decimal	500 μ cd	
	2621P	Bright Red (697 nm)		750 μ cd	
	2621G	Green (565 nm)		2000 μ cd	
	2621Y	Yellow (585 nm)		2000 μ cd	
	2621E	Orange (630 nm)		2000 μ cd	
	2721R	Red (655 nm)	Multiplex Common Cathode Rt. Hand Decimal	500 μ cd	
	2721P	Bright Red (697 nm)		750 μ cd	
	2721G	Green (565 nm)		2000 μ cd	
	2721Y	Yellow (585 nm)		2000 μ cd	
7mm (.28") Dual-In-Line .39"H × .89"W × .24"D	2721E	Orange (630 nm)		2000 μ cd	

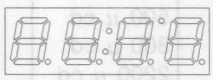
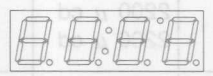
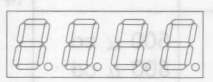
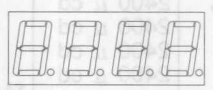
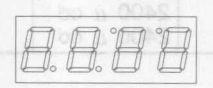
Selection Guide

· Three-Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @I_F=10mA	Page No.
 10mm (.40") Dual-In-Line .5"H × 1.18"W × .276"D	LTC- 4624R 4624P 4624G 4624Y 4624E	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Multiplex Common Anode, Rt. Hand Decimal	 500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	14-53
	4724R 4724P 4724G 4724Y 4724E	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Multiplex Common Cathode, Rt. Hand Decimal	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	
 13.2mm (.52") Dual-In-Line .7"H × 1.5"W × .28"D	LTC- 5836R 5836P 5836G 5836Y 5836E	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Anode, Rt.Hand Decimal	 500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	14-73
	5336R 5336P 5336G 5336Y 5336E	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm)	Common Cathode, Rt.Hand Decimal	500 μ cd 800 μ cd 2200 μ cd 2200 μ cd 2200 μ cd	
 14.22mm (.56") Dual-In-Line .75"H × 1.5"W × .32"D	LTC- 561R 561P 561G 561Y 561E 561HR	 Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red (635nm)	Multiplex, Common Anode, Rt. Hand Decimal	 600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	14-90
	571R 571P 571G 571Y 571E 571HR	Red (655 nm) Bright Red (697 nm) Green (565 nm) Yellow (585 nm) Orange (630 nm) Hi.-Eff.Red (635nm)	Multiplex, Common Cathode, Rt. Hand Decimal	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	

Selection Guide

· Four-Digit Numeric LED Displays

Package	Part No.	Color (λ P)	Description	Typ.Iv/SEG. @IF=10mA	Page No.
 7.0mm (.28") Dual-In-Line .39"H × 1.19"W × .24"D	LTC-2623R	Red (655 nm)	Multiplex Common Anode, Rt. Hand Decimal	500 μ cd	14-27
	2623P	Bright Red (697 nm)		750 μ cd	
	2623G	Green (565 nm)		2000 μ cd	
	2623Y	Yellow (585 nm)		2000 μ cd	
	2623E	Orange (630 nm)		2000 μ cd	
	2723R	Red (655 nm)	Multiplex Common Cathode, Rt. Hand Decimal	500 μ cd	
	2723P	Bright Red (697 nm)		750 μ cd	
	2723G	Green (565 nm)		2000 μ cd	
	2723Y	Yellow (585 nm)		2000 μ cd	
	2723E	Orange (630 nm)		2000 μ cd	
 10mm (.4") Dual-In-Line .5"H × 1.58"W × .28"D	LTC-4627R	Red (655 nm)	Multiplex Common Anode, Rt. Hand Decimal	500 μ cd	14-53
	4627P	Bright Red (697 nm)		800 μ cd	
	4627G	Green (565 nm)		2200 μ cd	
	4627Y	Yellow (585 nm)		2200 μ cd	
	4627E	Orange (630 nm)		2200 μ cd	
	4727R	Red (655 nm)	Multiplex Common Cathode, Rt. Hand Decimal	500 μ cd	
	4727P	Bright Red (697 nm)		800 μ cd	
	4727G	Green (565 nm)		2200 μ cd	
	4727Y	Yellow (585 nm)		2200 μ cd	
	4727E	Orange (630 nm)		2200 μ cd	
 13.2mm (.52") Dual-In-Line .7"H × 2.0"W × .28"D	LTC-5837R	Red (655 nm)	Common Anode, Rt. Hand Decimal	500 μ cd	14-73
	5837P	Bright Red (697 nm)		800 μ cd	
	5837G	Green (565 nm)		2200 μ cd	
	5837Y	Yellow (585 nm)		2200 μ cd	
	5837E	Orange (630 nm)		2200 μ cd	
	5337R	Red (655 nm)	Common Cathode, Rt. Hand Decimal	500 μ cd	
	5337P	Bright Red (697 nm)		800 μ cd	
	5337G	Green (565 nm)		2200 μ cd	
	5337Y	Yellow (585 nm)		2200 μ cd	
	5337E	Orange (630 nm)		2200 μ cd	
 14.22mm (.56") Dual-In-Line .75"H × 1.98"W × .32"D	LTC-5623R	Red (655 nm)	Multiplex Common Anode, Rt. Hand Decimal	600 μ cd	14-90
	5623P	Bright Red (697 nm)		950 μ cd	
	5623G	Green (565 nm)		2400 μ cd	
	5623Y	Yellow (585 nm)		2400 μ cd	
	5623E	Orange (630 nm)		2400 μ cd	
	5623HR	Hi.-Eff.Red (635 nm)		2400 μ cd	
	5723R	Red (655 nm)	Multiplex Common Cathode, Rt. Hand Decimal	600 μ cd	
	5723P	Bright Red (697 nm)		950 μ cd	
	5723G	Green (565 nm)		2400 μ cd	
	5723Y	Yellow (585 nm)		2400 μ cd	
	5723E	Orange (630 nm)		2400 μ cd	
	5723HR	Hi.-Eff.Red (635 nm)		2400 μ cd	
 14.22mm (.56") Dual-In-Line .75"H × 1.98"W × .32"D	LTC-5653G-01	Green(565nm)	Mulitiplex Common Anode,	2400 μ cd	14-83
	LTC-5653E-01	Orange (630 nm)		2400 μ cd	
	LTC-5753G-01	Green(565nm)	Mulitiplex Common Cathode,	2400 μ cd	
	LTC-5753E-01	Orange (630 nm)		2400 μ cd	

Cross Reference Guide for :

Q.T.C./H.P./TELEFUNKEN/SIEMENS/TOSHIBA/MATSUSHITA/ROHM

In order to designate the similarity between the other manufacturers' device and the nearest LITON equivalent. This guide has been included a letter code system to cover this.

Code Definitions :

A - LITON device is electrically and mechanically equivalent.
B - Minor electrical differences exist.
C - Minor mechanical differences exist.
D - Significant electrical differences exist.
E - Significant mechanical differences exist.

Since Optoelectronics is a relatively young industry, it is possible that different devices offered by two or more manufacturers will satisfy the requirements of one application. Therefore, slight mechanical of electrical variations should not disqualify the nearest equivalent.

The data contained in this guide is believed to be accurated. However, no responsibility is assumed by TAIWAN LITON ELECTRONIC CO., LTD. for the use of this data in actual circuit design.

Cross Reference Guide

Q.T. (Quality Technology) Equivalent LED Numeric Display

QT Part No.	Digit Size	Color	LITON Part No.	Code
MAN-71A	0.3" 1D	Red	LTS-312AR	A
MAN-72A	0.3" 1D	Red	LTS-312AR	A
MAN-73A	0.3" 1D	Red	LTS-316AR	A
MAN-74A	0.3" 1D	Red	LTS-315AR	A
MAN-78A	0.3" 1D	Red	LTS-313AR	A
MAN-3410A	0.3" 1D	Green	LTS-312AG	A
MAN-3420A	0.3" 1D	Green	LTS-312AG	A
MAN-3430A	0.3" 1D	Green	LTS-316AG	A
MAN-3440A	0.3" 1D	Green	LTS-315AG	A
MAN-3480A	0.3" 1D	Green	LTS-313AG	A
MAN-3610A	0.3" 1D	Orange	LTS-312AE	A
MAN-3620A	0.3" 1D	Orange	LTS-312AE	A
MAN-3630A	0.3" 1D	Orange	LTS-316AE	A
MAN-3640A	0.3" 1D	Orange	LTS-315AE	A
MAN-3680A	0.3" 1D	Orange	LTS-313AE	A
MAN-3810A	0.3" 1D	Yellow	LTS-312AY	A
MAN-3820A	0.3" 1D	Yellow	LTS-312AY	A
MAN-3830A	0.3" 1D	Yellow	LTS-316AY	A
MAN-3840A	0.3" 1D	Yellow	LTS-315AY	A
MAN-3880A	0.3" 1D	Yellow	LTS-313AY	A
MAN-3910A	0.3" 1D	H.R.	LTS-312AHR	A
MAN-3920A	0.3" 1D	H.R.	LTS-312AHR	A
MAN-3930A	0.3" 1D	H.R.	LTS-316AHR	A
MAN-3940A	0.3" 1D	H.R.	LTS-315AHR	A
MAN-3980A	0.3" 1D	H.R.	LTS-313AHR	A
FND-350	0.36" 1D	Red	LTS-360R	A
FND-357	0.36" 1D	Red	LTS-367R	A
FND-358	0.36" 1D	Red	LTS-368R	A
FND-360	0.36" 1D	Bright Red	LTS-360P	A
FND-367	0.36" 1D	Bright Red	LTS-367P	A
FND-368	0.36" 1D	Bright Red	LTS-368P	A
FND-310	0.36" 1D	H.R.	LTS-360HR	A
FND-317	0.36" 1D	H.R.	LTS-367HR	A
FND-318	0.36" 1D	H.R.	LTS-368HR	A
MAN-4405A	0.4" 1D	Green	LTS-4505AG	A
MAN-4410A	0.4" 1D	Green	LTS-4510AG	A
MAN-4440A	0.4" 1D	Green	LTS-4540AG	A

QT Part No.	Digit Size	Color	LITON Part No.	Code
MAN-4480A	0.4" 1D	Green	LTS-4580AG	A
MAN-4605A	0.4" 1D	Orange	LTS-4605AE	A
MAN-4610A	0.4" 1D	Orange	LTS-4610AE	A
MAN-4640A	0.4" 1D	Orange	LTS-4640AE	A
MAN-4680A	0.4" 1D	Orange	LTS-4680AE	A
MAN-4705A	0.4" 1D	Red	LTS-4705AR	A
MAN-4710A	0.4" 1D	Red	LTS-4710AR	A
MAN-4740A	0.4" 1D	Red	LTS-4740AR	A
MAN-4780A	0.4" 1D	Red	LTS-4780AR	A
MAN-4805A	0.4" 1D	Yellow	LTS-4805AY	A
MAN-4810A	0.4" 1D	Yellow	LTS-4810AY	A
MAN-4840A	0.4" 1D	Yellow	LTS-4840AY	A
MAN-4880A	0.4" 1D	Yellow	LTS-4880AY	A
MAN-4905A	0.4" 1D	H.R.	LTS-4905AHR	A
MAN-4910A	0.4" 1D	H.R.	LTS-4910AHR	A
MAN-4940A	0.4" 1D	H.R.	LTS-4940AHR	A
MAN-4980A	0.4" 1D	H.R.	LTS-4980AHR	A
MAN-6460	0.56" 1D	Green	LTS-6460G	A
MAN-6660	0.56" 1D	Orange	LTS-6660E	A
MAN-6680	0.56" 1D	Orange	LTS-6680E	A
MAN-6760	0.56" 1D	Red	LTS-6760R	A
MAN-6780	0.56" 1D	Red	LTS-6780R	A
MAN-6860	0.56" 1D	Yellow	LTS-6860Y	A
MAN-6880	0.56" 1D	Yellow	LTS-6880Y	A
MAN-6960	0.56" 1D	H.R.	LTS-6960HR	A
MAN-6980	0.56" 1D	H.R.	LTS-6980HR	A
MAN-6475	0.56" 1D	Green	LTS-6475G	A
MAN-6495	0.56" 1D	Green	LTS-6495G	A
MAN-6675	0.56" 1D	Orange	LTS-6675E	A
MAN-6695	0.56" 1D	Orange	LTS-6695E	A
MAN-6775	0.56" 1D	Red	LTS-6775R	A
MAN-6795	0.56" 1D	Red	LTS-6795R	A
MAN-6875	0.56" 1D	Yellow	LTS-6875Y	A
MAN-6895	0.56" 1D	Yellow	LTS-6895Y	A
MAN-6975	0.56" 1D	H.R.	LTS-6975HR	A
MAN-6995	0.56" 1D	H.R.	LTS-6995HR	A

Cross Reference Guide

Q.T. (Quality Technology) Equivalent LED Numeric Display

QT Part No.	Digit Size	Color	LITON Part No.	Code
MAN-8410	0.8" 1D	Green	LTS-3410LG	D
MAN-8430	0.8" 1D	Green	LTS-3406LG	D
MAN-8440	0.8" 1D	Green	LTS-3403LG	D
MAN-8450	0.8" 1D	Green	LTS-3406LG	D
MAN-8610	0.8" 1D	Orange	LTS-3401LE	D
MAN-8630	0.8" 1D	Orange	LTS-3406LE	D
MAN-8640	0.8" 1D	Orange	LTS-3403LE	D
MAN-8650	0.8" 1D	Orange	LTS-3406LE	D
MAN-8810	0.8" 1D	Yellow	LTS-3401LY	D
MAN-8830	0.8" 1D	Yellow	LTS-3406LY	D
MAN-8840	0.8" 1D	Yellow	LTS-3403LY	D
MAN-8850	0.8" 1D	Yellow	LTS-3406LY	D
MAN-8910	0.8" 1D	H.R.	LTS-3401LE	D
MAN-8930	0.8" 1D	H.R.	LTS-3406LE	D
MAN-8940	0.8" 1D	H.R.	LTS-3403LE	D
MAN-8950	0.8" 1D	H.R.	LTS-3406LE	D
MAN-6410	0.56" 1D	Green	LTD-6410G	A
MAN-6430	0.56" 1D	Green	LTD-6430G	A
MAN-6440	0.56" 1D	Green	LTD-6440G	A
MAN-6450	0.56" 1D	Green	LTD-6450G	A
MAN-6610	0.56" 1D	Orange	LTD-6610E	A
MAN-6630	0.56" 1D	Orange	LTD-6630E	A

QT Part No.	Digit Size	Color	LITON Part No.	Code
MAN-6640	0.56" 2D	Orange	LTD-6640E	A
MAN-6650	0.56" 2D	Orange	LTD-6650E	A
MAN-6710	0.56" 2D	Red	LTD-6710R	A
MAN-6730	0.56" 2D	Red	LTD-6730R	A
MAN-6740	0.56" 2D	Red	LTD-6740R	A
MAN-6750	0.56" 2D	Red	LTD-6750R	A
MAN-6830	0.56" 2D	Yellow	LTD-6830Y	A
MAN-6840	0.56" 2D	Yellow	LTD-6840Y	A
MAN-6850	0.56" 2D	Yellow	LTD-6850Y	A
MAN-6910	0.56" 2D	H.R.	LTD-6910HR	A
MAN-6930	0.56" 2D	H.R.	LTD-6930HR	A
MAN-6940	0.56" 2D	H.R.	LTD-6940HR	A
MAN-6950	0.56" 2D	H.R.	LTD-6950HR	A
MAN-2A	0.32" 1D	Red	LTP-305R	A
GMA-2175	2.0" 1D	Orange	LTP-2057AE	A
GMC-2715	2.0" 1D	Orange	LTP-2157AE	A
GMA-2475	2.0" 1D	Green	LTP-2057AG	A
GMC-2475	2.0" 1D	Green	LTP-2157AG	A
GMA-2185	2.4" 1D	Orange	LTP-2058AE	A
GMC-2185	2.4" 1D	Orange	LTP-2158AE	A
GMA-2485	2.4" 1D	Green	LTP-2058AG	A
GMC-2485	2.4" 1D	Green	LTP-2158AG	A

Cross Reference Guide

H.P. (Hewlett Packard) Equivalent LED Numeric Display

H.P. Part No.	Digit Size	Color	LITON Part No.	Code
HDSP-7301	0.3" 1D	Red	LTS-360R	C
HDSP-7303	0.3" 1D	Red	LTS-367R	C
HDSP-7308	0.3" 1D	Red	LTS-368R	C
HDSP-7311	0.3" 1D	Bright Red	LTS-360P	C
HDSP-7313	0.3" 1D	Bright Red	LTS-367P	C
HDSP-7318	0.3" 1D	Bright Red	LTS-368P	C
HDSP-7501	0.3" 1D	H.R.	LTS-360HR	C
HDSP-7503	0.3" 1D	H.R.	LTS-367HR	C
HDSP-7508	0.3" 1D	H.R.	LTS-368HR	C
HDSP-7801	0.3" 1D	Green	LTS-360G	C
HDSP-7803	0.3" 1D	Green	LTS-367G	C
HDSP-7808	0.3" 1D	Green	LTS-368G	C
5082-7730	0.3" 1D	Red	LTS-312AR	A
5082-7731	0.3" 1D	Red	LTS-312AR	A
5082-7736	0.3" 1D	Red	LTS-311AR	A
5082-7740	0.3" 1D	Red	LTS-313AR	A
5082-7610	0.3" 1D	H.R.	LTS-312AHR	A
5082-7611	0.3" 1D	H.R.	LTS-312AHR	A
5082-7613	0.3" 1D	H.R.	LTS-313AHR	A
5082-7616	0.3" 1D	H.R.	LTS-311AHR	A
5082-7620	0.3" 1D	Yellow	LTS-312AY	A
5082-7621	0.3" 1D	Yellow	LTS-312AY	A
5082-7623	0.3" 1D	Yellow	LTS-313AY	A
5082-7626	0.3" 1D	Yellow	LTS-311AY	A
HDSP-3600	0.3" 1D	Green	LTS-312AG	A
HDSP-3601	0.3" 1D	Green	LTS-312AG	A
HDSP-3603	0.3" 1D	Green	LTS-312AG	A
HDSP-3606	0.3" 1D	Green	LTS-311AG	A
HDSP-3530	0.3" 1D	Orange	LTS-312AE	B
HDSP-3531	0.3" 1D	Orange	LTS-312AE	B
HDSP-3533	0.3" 1D	Orange	LTS-313AE	B
HDSP-3536	0.3" 1D	Orange	LTS-311AE	B
HDSP-4030	0.3" 1D	Yellow	LTS-312AY	B
HDSP-4031	0.3" 1D	Yellow	LTS-312AY	B
HDSP-4033	0.3" 1D	Yellow	LTS-313AY	B
HDSP-4036	0.3" 1D	Yellow	LTS-311AY	B

H.P. Part No.	Digit Size	Color	LITON Part No.	Code
HDSP-F001	0.4" 1D	Red	LTS-4801R	A
HDSP-F003	0.4" 1D	Red	LTS-4301R	A
HDSP-F201	0.4" 1D	Orange	LTS-4801E	A
HDSP-F203	0.4" 1D	Orange	LTS-4301E	A
HDSP-F151	0.4" 1D	GaAlAs Red	LTS-4801AC	A
HDSP-F153	0.4" 1D	GaAlAs Red	LTS-4301AC	A
HDSP-5301	0.56" 1D	Red	LTS-5301AR	A
HDSP-5303	0.56" 1D	Red	LTS-5303AR	A
HDSP-5501	0.56" 1D	Orange	LTS-5501AE	A
HDSP-5503	0.56" 1D	Orange	LTS-5503AE	A
HDSP-5701	0.56" 1D	Yellow	LTS-5701AY	A
HDSP-5703	0.56" 1D	Yellow	LTS-5703AY	A
HDSP-5531	0.56" 1D	Orange	LTS-5501AE	B
HDSP-5533	0.56" 1D	Orange	LTS-5503AE	B
HDSP-5731	0.56" 1D	Yellow	LTS-5701AY	B
HDSP-5733	0.56" 1D	Yellow	LTS-5703AY	B
HDSP-3400	0.8" 1D	Red	LTS-3401LR	A
HDSP-3401	0.8" 1D	Red	LTS-3401LR	A
HDSP-3403	0.8" 1D	Red	LTS-3403LR	A
HDSP-3405	0.8" 1D	Red	LTS-3403LR	A
HDSP-3406	0.8" 1D	Red	LTS-3406LR	A
HDSP-3900	0.8" 1D	Orange	LTS-3401LE	A
HDSP-3901	0.8" 1D	Orange	LTS-3401LE	A
HDSP-3903	0.8" 1D	Orange	LTS-3403LE	A
HDSP-3905	0.8" 1D	Orange	LTS-3403LE	A
HDSP-3906	0.8" 1D	Orange	LTS-3406LE	A
HDSP-4200	0.8" 1D	Yellow	LTS-3401LY	A
HDSP-4201	0.8" 1D	Yellow	LTS-3401LY	A
HDSP-4203	0.8" 1D	Yellow	LTS-3403LY	A
HDSP-4205	0.8" 1D	Yellow	LTS-3403LY	A
HDSP-4206	0.8" 1D	Yellow	LTS-3406LY	A
HDSP-8600	0.8" 1D	Green	LTS-3401LG	A
HDSP-8601	0.8" 1D	Green	LTS-3401LG	A
HDSP-8603	0.8" 1D	Green	LTS-3403LG	A
HDSP-8605	0.8" 1D	Green	LTS-3403LG	A
HDSP-8606	0.8" 1D	Green	LTS-3406LG	A

Cross Reference Guide

H.P. (Hewlett Packard) Equivalent LED Numeric Display

H.P. Part No.	Digit Size	Color	LITON Part No.	Code
HDSP-5321	0.56" 2D	Red	LTD-5321AR	A
HDSP-5323	0.56" 2D	Red	LTD-5323AR	A
HDSP-5521	0.56" 2D	Orange	LTD-5521AE	A
HDSP-5523	0.56" 2D	Orange	LTD-5523AE	A
HDSP-5621	0.56" 2D	Green	LTD-5621AG	A
HDSP-5623	0.56" 2D	Green	LTD-5623AG	A
HDSP-5721	0.56" 2D	Yellow	LTD-5721AY	A
HDSP-5723	0.56" 2D	Yellow	LTD-5723AY	A

Cross Reference Guide

TELEFUNKEN Equivalent LED Numeric Display

TELEFUNKEN Part No.	Digit Size	Color	LITON Part No.	Code
D200-PA	0.4" 1D	Red	LTS-4710AR	E
D200-PK	0.4" 1D	Red	LTS-4780AR	E
D201-PA	0.4" 1D	Orange	LTS-4610AE	E
D201-PK	0.4" 1D	Orange	LTS-4680AE	E
D202-PA	0.4" 1D	Green	LTS-4510AG	E
D202-PK	0.4" 1D	Green	LTS-4580AG	E
D203-PA	0.4" 1D	Yellow	LTS-4810AY	E
D203-PK	0.4" 1D	Yellow	LTS-4880AY	E
D290-PA	0.4" 1D	Red	LTS-4705AR	E
D290-PK	0.4" 1D	Red	LTS-4705AR	E
D291-PA	0.4" 1D	Orange	LTS-4605AE	E
D291-PK	0.4" 1D	Orange	LTS-4605AE	E
D292-PA	0.4" 1D	Green	LTS-4505AG	E
D292-PK	0.4" 1D	Green	LTS-4505AG	E
D293-PA	0.4" 1D	Yellow	LTS-4805AY	E
D390-PA	0.51" 1D	Red	LTS-548AR	D
D390-PK	0.51" 1D	Red	LTS-549AR	D
D391-PA	0.51" 1D	Orange	LTS-548AE	D
D391-PK	0.51" 1D	Orange	LTS-549AE	D

TELEFUNKEN Part No.	Digit Size	Color	LITON Part No.	Code
D392-PA	0.51" 1D	Green	LTS-548AG	D
D392-PK	0.51" 1D	Green	LTS-549AG	D
D393-PA	0.51" 1D	Yellow	LTS-548AY	D
D393-PK	0.51" 1D	Yellow	LTS-549AY	D
D350-PA	0.51" 1D	Red	LTS-5301AR	C
D350-PK	0.51" 1D	Red	LTS-5303AR	C
D351-PA	0.51" 1D	Orange	LTS-5501AE	C
D351-PK	0.51" 1D	Orange	LTS-5503AE	C
D353-PA	0.51" 1D	Yellow	LTS-5701AY	C
D353-PK	0.51" 1D	Yellow	LTS-5703AY	C
TDDR-5250	0.51" 2D	Red	LTD-6710R	C
TDDR-5260	0.51" 2D	Red	LTD-6740R	C
TDDO-5250	0.51" 2D	Orange	LTD-6610E	C
TDDO-5260	0.51" 2D	Orange	LTD-6640E	C
TDDY-5250	0.51" 2D	Yellow	LTD-6810Y	C
TDDY-5260	0.51" 2D	Yellow	LTD-6840Y	C
TDDG-5250	0.51" 2D	Green	LTD-6410G	C
TDDG-5260	0.51" 2D	Green	LTD-6440G	C

Cross Reference Guide

SIEMENS (LITRONIX) Equivalent LED Numeric Display

SIEMENS Part No.	Digit Size	Color	LITON Part No.	Code
HD-1131R	0.52" 1D	Red	LTS-546AR	A
HD-1133R	0.52" 1D	Red	LTS-547AR	A
HD-1131O	0.52" 1D	H.R.	LTS-546AHR	A
HD-1133O	0.52" 1D	H.R.	LTS-547AHR	A
HD-1131G	0.52" 1D	Green	LTS-546AG	A
HD-1133G	0.52" 1D	Green	LTS-547AG	A
HD-1075R	0.28" 1D	Red	LTS-2801AR	A
HD-1077R	0.28" 1D	Red	LTS-2301AR	A
HD-1075G	0.28" 1D	Green	LTS-2801AG	A
HD-1077G	0.28" 1D	Green	LTS-2301AG	A
HDSP-7301	0.3" 1D	Red	LTS-313AR	A
HDSP-7501	0.3" 1D	H.R.	LTS-313AHR	A
HDSP-7801	0.3" 1D	Green	LTS-313AG	A
HD-1105R	0.4" 1D	Red	LTS-360R	E
HD-1107R	0.4" 1D	Red	LTS-4780AR	C
HD-1108R	0.4" 1D	Red	LTS-368R	E
HD-1105O	0.4" 1D	H.R.	LTS-360HR	E
HD-1107O	0.4" 1D	H.R.	LTS-367HR	E
HD-1108O	0.4" 1D	H.R.	LTS-368HR	E
HD-1105G	0.4" 1D	Green	LTS-360G	E
HD-1107G	0.4" 1D	Green	LTS-4580AG	C
HD-1108G	0.4" 1D	Green	LTS-368G	E
HD-1131R	0.53" 1D	Red	LTS-546AR	C
HD-1123R	0.53" 1D	Red	LTS-548AR	D
HD-1133R	0.53" 1D	Red	LTS-547AR	C
HD-1134R	0.53" 1D	Red	LTS-549AR	D
HD-1131O	0.53" 1D	H.R.	LTS-546AHR	C
HD-1132O	0.53" 1D	H.R.	LTS-548AHR	D

SIEMENS Part No.	Digit Size	Color	LITON Part No.	Code
HD-1133O	0.53" 1D	H.R.	LTS-547AHR	C
HD-1134O	0.53" 1D	H.R.	LTS-549AHR	D
HD-1131Y	0.53" 1D	Yellow	LTS-546AY	C
HD-1132Y	0.53" 1D	Yellow	LTS-548AY	D
HD-1133Y	0.53" 1D	Yellow	LTS-547AY	C
HD-1134Y	0.53" 1D	Yellow	LTS-549AY	D
HD-1131G	0.53" 1D	Green	LTS-546AG	C
HD-1132G	0.53" 1D	Green	LTS-548AG	D
HD-1133G	0.53" 1D	Green	LTS-547AG	C
HD-1134G	0.53" 1D	Green	LTS-549AG	D
DL-3400	0.8" 1D	Red	LTS-3401LR	A
DL-3401	0.8" 1D	Red	LTS-3401LRA	A
DL-3403	0.8" 1D	Red	LTS-3403LR	A
DL-3405	0.8" 1D	Red	LTS-3403LR	A
DL-3406	0.8" 1D	Red	LTS-3406LR	A
DL-3900	0.8" 1D	Orange	LTS-3401LE	A
DL-3901	0.8" 1D	Orange	LTS-3401LE	A
DL-3903	0.8" 1D	Orange	LTS-3403LE	A
DL-3905	0.8" 1D	Orange	LTS-3403LE	A
DL-3906	0.8" 1D	Orange	LTS-3406LE	A
DL-5735	0.7" 1D	Red	LTP-747R	D
DLG-5735	0.7" 1D	Green	LTP-747G	D
DL-57	0.3" 1D	Red	LTP-305R	A
RBG-1000	10ARRAY	Red	LTA-1000R	C
OBG-1000	10ARRAY	Orange	LTA-1000E	C
YBG-1000	10ARRAY	Yellow	LTA-1000Y	C
GBG-1000	10ARRAY	Green	LTA-1000G	C

Cross Reference Guide

TOSHIBA Equivalent LED Numeric Display

TOSHIDA Part No.	Digit Size	Color	LITON Part No.	Code
TLR-332	0.3" 1D	Red	LTS-313AR	A
TLR-333	0.3" 1D	Red	LTS-312AR	A
TLR-334	0.3" 1D	Red	LTS-311AR	A
TLR-335	0.3" 1D	Red	LTS-312AR	A
TLG-332	0.3" 1D	Green	LTS-313AG	A
TLG-333	0.3" 1D	Green	LTS-312AG	A
TLG-334	0.3" 1D	Green	LTS-311AG	A
TLG-335	0.3" 1D	Green	LTS-312AG	A
TLR-368	0.52" 1D	Red	LTS-547AR	A
TLR-369	0.52" 1D	Red	LTS-546AR	A
TLG-368	0.52" 1D	Green	LTS-547AG	A
TLG-369	0.52" 1D	Green	LTS-546AG	A
TLR-362	0.56" 1D	Red	LTS-5303AR	A
TLR-363	0.56" 1D	Red	LTS-5301AR	A
TLG-362	0.56" 1D	Green	LTS-5603AG	A
TLG-363	0.56" 1D	Green	LTS-5601AG	A
TLS-362	0.56" 1D	GaAlAs Red	LTS-5003AC	A
TLS-363	0.56" 1D	GaAlAs Red	LTS-5001AC	A
TLR-366	0.56" 1D	Red	LTS-5323AR	A
TLR-367	0.56" 1D	Red	LTS-5321AR	A
TLG-366	0.56" 1D	Green	LTS-5623AG	A
TLG-367	0.56" 1D	Green	LTS-5621AG	A
TLS-366	0.56" 1D	GaAlAs Red	LTS-5023AC	A
TLS-367	0.56" 1D	GaAlAs Red	LTS-5021AC	A

TOSHIDA Part No.	Digit Size	Color	LITON Part No.	Code
TLR-312	0.33" 1D	Bright Red	LTS-367P	E
TLR-313	0.33" 1D	Bright Red	LTS-360P	E
TLR-315	0.33" 1D	Bright Red	LTS-368P	E
TLR-312	0.33" 1D	Green	LTS-367G	E
TLR-313	0.33" 1D	Green	LTS-360G	E
TLR-315	0.33" 1D	Green	LTS-368G	E
TLR-370	0.5" 1D	Bright Red	LTP-537P	A
TLR-371	0.5" 1D	Bright Red	LTP-587P	A
TLR-370	0.5" 1D	Green	LTP-537G	A
TLR-371	0.5" 1D	Green	LTP-587G	A
TLR-322	0.3" 2D	Red	LTD-322R	A
TLR-323	0.3" 2D	Red	LTD-323R	A
TLG-322	0.3" 2D	Green	LTD-322G	A
TLG-323	0.3" 2D	Green	LTD-323G	A
TLR-320	0.4" 2D	Bright Red	LTD-432PC	A
TLR-321	0.4" 2D	Bright Red	LTD-482PC	A
TLG-320	0.4" 2D	Green	LTD-432GC	A
TLG-321	0.4" 2D	Green	LTD-482GC	A
TLR-366	0.56" 2D	Bright Red	LTD-6740P	C
TLR-367	0.56" 2D	Bright Red	LTD-6710P	C
TLG-366	0.56" 2D	Green	LTD-6440G	C
TLG-367	0.56" 2D	Green	LTD-6410G	C

Cross Reference Guide

MATSUSHITA (Panasonic) Equivalent LED Numeric Display

MATSUSHIta Part No.	Digit Size	Color	LITON Part No.	Code
LN-513RA	0.3" 1D	Red	LTS-312AR	C
LN-513RK	0.3" 1D	Red	LTS-315AR	D
LN-513GA	0.3" 1D	Green	LTS-312AG	C
LN-513GK	0.3" 1D	Green	LTS-315AG	D
LN-513YA	0.3" 1D	Yellow	LTS-312AY	C
LN-513YK	0.3" 1D	Yellow	LTS-315AY	D
LN-513OA	0.3" 1D	Orange	LTS-312AE	C
LN-513OK	0.3" 1D	Orange	LTS-315AE	D
LN-513RKS	0.3" 1D	Red	LTS-313AR	D
LN-513GKS	0.3" 1D	Green	LTS-313AG	D
LN-513YKS	0.3" 1D	Yellow	LTS-313AY	D
LN-513OKS	0.3" 1D	Orange	LTS-313AE	D
LN-516RA	0.56" 1D	Red	LTS-5301AR	C
LN-516RK	0.56" 1D	Red	LTS-5303AR	C
LN-516GA	0.56" 1D	Green	LTS5801AG	C
LN-516GK	0.56" 1D	Green	LTS-5803AG	C
LN-516YA	0.56" 1D	Yellow	LTS-5701AY	C
LN-516YK	0.56" 1D	Yellow	LTS-5703AY	C

MATSUSHITA Part No.	Digit Size	Color	LITON Part No.	Code
LN-516OA	0.56" 1D	Orange	LTS-5501AE	C
LN-516OK	0.56" 1D	Orange	LTS-5503AE	C
LN-524RA	0.43" 1D	Red	LTD-6710R	C
LN-524RK	0.43" 2D	Red	LTD-6740R	C
LN-524GA	0.43" 2D	Green	LTD-6410G	C
LN-524GK	0.43" 2D	Green	LTD-6440G	C
LN-524YA	0.43" 2D	Yellow	LTD-6810Y	C
LN-524YK	0.43" 2D	Yellow	LTD-6840Y	C
LN-524OA	0.43" 2D	Orange	LTD-6610E	C
LN-524OK	0.43" 2D	Orange	LTD-6640E	C
LN-526RA	0.56" 2D	Red	LTD-6710R	C
LN-526RK	0.56" 2D	Red	LTD-6740R	C
LN-526GA	0.56" 2D	Green	LTD-6410G	C
LN-526GK	0.56" 2D	Green	LTD-6440G	C
LN-526YA	0.56" 2D	Yellow	LTD-6810Y	C
LN-526YK	0.56" 2D	Yellow	LTD-6840Y	C
LN-526OA	0.56" 2D	Orange	LTD-6610E	C
LN-526OK	0.56" 2D	Orange	LTD-6640E	C

Cross Reference Guide

ROHM Equivalent LED Numeric Display

ROHM Part No.	Digit Size	Color	LITON Part No.	Code
LA-301VB	0.31" 1D	Bright Red	LTS-360P	D
LA-301VL	0.31" 1D	Bright Red	LTS-367P	D
LA-301VM	0.31" 1D	Bright Red	LTS-368P	D
LA-301OB	0.31" 1D	H.R.	LTS-360HR	D
LA-301OL	0.31" 1D	H.R.	LTS-367HR	D
LA-301OM	0.31" 1D	H.R.	LTS-368HR	D
LA-301MB	0.31" 1D	Green	LTS-360G	D
LA-301ML	0.31" 1D	Green	LTS-367G	D
LA-301MM	0.31" 1D	Green	LTS-368G	D
LA-301VA	0.31" 1D	Red	LTS-312AR	C
LA-301VK	0.31" 1D	Red	LTS-315AR	D
LA-301OA	0.31" 1D	H.R.	LTS-312AHR	C
LA-301OK	0.31" 1D	H.R.	LTS-315AHR	D
LA-301YA	0.31" 1D	Yellow	LTS-312AY	C
LA-301YK	0.31" 1D	Yellow	LTS-315AY	D
LA-301MA	0.31" 1D	Green	LTS-312AG	C
LA-301MK	0.31" 1D	Green	LTS-315AG	D
LA-401VF	0.4" 1D	Red	LTS-546AR	C
LA-401VP	0.4" 1D	Red	LTS-547AR	C
LA-401OF	0.4" 1D	H.R.	LTS-546AHR	C
LA-401OP	0.4" 1D	H.R.	LTS-547AHR	C
LA-401YF	0.4" 1D	Yellow	LTS-546AY	C
LA-401YP	0.4" 1D	Yellow	LTS-547AY	C
LA-401MF	0.4" 1D	Green	LTS-546AG	C
LA-401MP	0.4" 1D	Green	LTS-547AG	C
LA-501VA	0.5" 1D	Red	LTS-546AR	E
LA-501VK	0.5" 1D	Red	LTS-547AR	E
LA-501OA	0.5" 1D	H.R.	LTS-546AHR	E
LA-501OK	0.5" 1D	H.R.	LTS-547AHR	E
LA-501YA	0.5" 1D	Yellow	LTS-546AY	E
LA-501YK	0.5" 1D	Yellow	LTS-547AY	E
LA-501MA	0.5" 1D	Green	LTS-546AG	E
LA-501MK	0.5" 1D	Green	LTS-547AG	E
LA-501VF	0.5" 1D	Red	LTS-546AR	C
LA-501VP	0.5" 1D	Red	LTS-547AR	C

ROHM Part No.	Digit Size	Color	LITON Part No.	Code
LA-501OF	0.5" 1D	H.R.	LTS-546AHR	C
LA-501OP	0.5" 1D	H.R.	LTS-547AHR	C
LA-501YF	0.5" 1D	Yellow	LTS-546AY	C
LA-501YP	0.5" 1D	Yellow	LTS-547AY	C
LA-501MF	0.5" 1D	Green	LTS-546AG	C
LA-501MP	0.5" 1D	Green	LTS-547AG	C
LA-801VF	0.8" 1D	Bright Red	LTS-3401LP	E
LA-801VP	0.8" 1D	Bright Red	LTS-3403LP	E
LA-801OF	0.8" 1D	H.R.	LTS-3401LE	E
LA-801OP	0.8" 1D	H.R.	LTS-3403LE	E
LA-801YF	0.8" 1D	Yellow	LTS-3401LY	E
LA-801YP	0.8" 1D	Yellow	LTS-3403LY	E
LA-801MF	0.8" 1D	Green	LTS-3401LG	E
LA-801MP	0.8" 1D	Green	LTS-3403LG	E
LB-202VB	0.3" 2D	Red	LTD-323R	D
LB-202VL	0.3" 2D	Red	LTD-322R	D
LB-202MB	0.3" 2D	Green	LTD-323G	D
LB-202ML	0.3" 2D	Green	LTD-322G	D
LB-402VA	0.4" 2D	Red	LTP-482RC	D
LB-402VK	0.4" 2D	Red	LTS-432RC	D
LB-402OA	0.4" 2D	H.R.	LTP-482PC	D
LB-402OK	0.4" 2D	H.R.	LTP-432PC	D
LA-402MA	0.4" 2D	Green	LTD-482GC	C
LA-402MK	0.4" 2D	Green	LTD-432GC	C
LA-602VA	0.56" 2D	Bright Red	LTD-6710P	C
LA-602VK	0.56" 2D	Bright Red	LTD-6740P	C
LA-602OA	0.56" 2D	H.R.	LTD-6910HR	C
LA-602OK	0.56" 2D	H.R.	LTD-6940HR	C
LA-602YA	0.56" 2D	Yellow	LTD-6810Y	C
LA-602YK	0.56" 2D	Yellow	LTD-6840Y	C
LA-602MA	0.56" 2D	Green	LTD-6410G	C
LA-602MK	0.56" 2D	Green	LTD-6440G	C

5" Single Color & Multicolor Ultra Large Single Digit LED Numeric LED Displays

LTS-50000 Series

Features

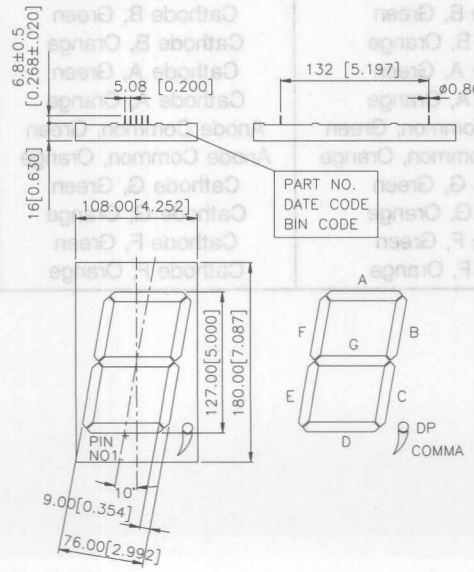
- 5 inch (127.0mm) ultra large digit height.
- Continuous uniform segments.
- Low power requirement.
- Excellent characters appearance.
- High contrast.
- High brightness.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board.
- Single color displays have the choice of two bright color - green/high efficiency red.
- Multicolor displays are applicable to three bright colors - green, orange and yellow (green and orange mixed).

Description

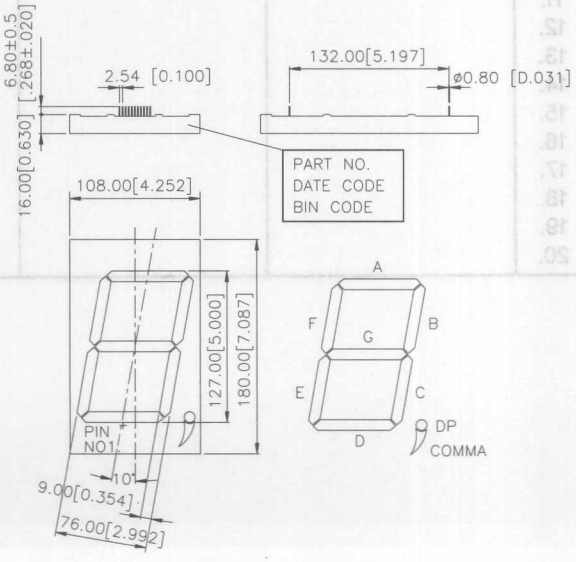
The LTS-50000 series are 5 inch (127.0mm) height ultra large single digit displays.
The LTS-50301/50801 series are singles displays.
The green displays have black face and green segments, the high efficiency red displays have black face and red segments.
The LTS-50302A/50802A are multicolor displays.
The multicolor displays have black face and white segments.
The green series utilize LED chips which are made from GaP on a transparent GaP substrate. The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.

Package Dimensions

A.LTS-50301/50801



B.LTS-50302A/50802A



Devices

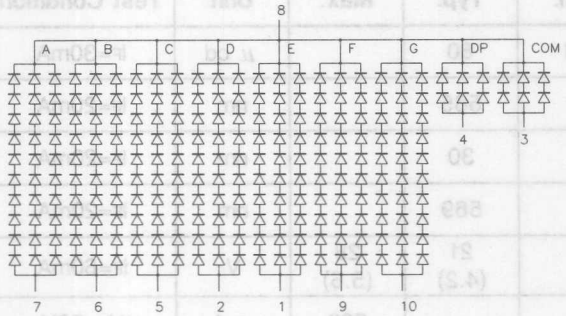
Part No. LTS-			Description	Package Dimension	Internal Circuit Diagram
GREEN	Hi.-Eff. Red	Multi- Color			
50301G	50301HRB	-	Common Cathode	A	A
50801G	50801HRB	-	Common Anode	A	B
-	-	50302A	Common Cathode	B	C
-	-	50802A	Common Anode	B	D

Pin Connection

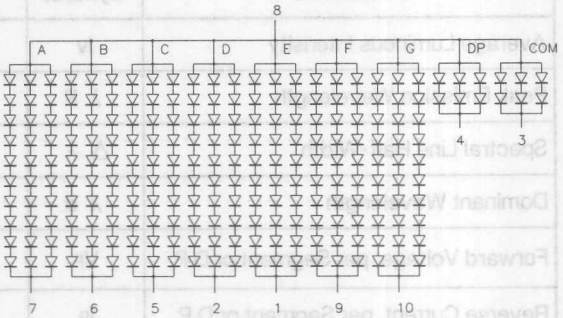
Pin No.	Connection			
	LTS-50301	LTS-50801	LTS-50302A	LTS-50802A
1.	Segment E Anode	Segment E Cathode	Anode E, Green	Cathode E, Green
2.	Segment D Anode	Segment D Cathode	Anode E, Orange	Cathode E, Orange
3.	Comma Anode	Comma Cathode	Anode D, Green	Cathode D, Green
4.	D.P. Anode	D.P. Cathode	Anode D, Orange	Cathode D, Orange
5.	Segment C Anode	Segment C Cathode	Anode Comma, Green	Cathode Comma, Green
6.	Segment B Anode	Segment B Cathode	Anode Comma, Orange	Cathode Comma, Orange
7.	Segment A Anode	Segment A Cathode	Anode DP. Green	Cathode DP. Green
8.	Common Cathode	Common Anode	Anode DP. Orange	Cathode DP. Orange
9.	Segment F Anode	Segment F Cathode	Anode C, Green	Cathode C, Green
10.	Segment G Anode	Segment G Cathode	Anode C, Orange	Cathode C, Orange
11.			Anode B, Green	Cathode B, Green
12.			Anode B, Orange	Cathode B, Orange
13.			Anode A, Green	Cathode A, Green
14.			Anode A, Orange	Cathode A, Orange
15.			Cathode Common, Green	Anode Common, Green
16.			Cathode Common, Orange	Anode Common, Orange
17.			Anode G, Green	Cathode G, Green
18.			Anode G, Orange	Cathode G, Orange
19.			Anode F, Green	Cathode F, Green
20.			Anode F, Orange	Cathode F, Orange

Internal Circuit Diagrams

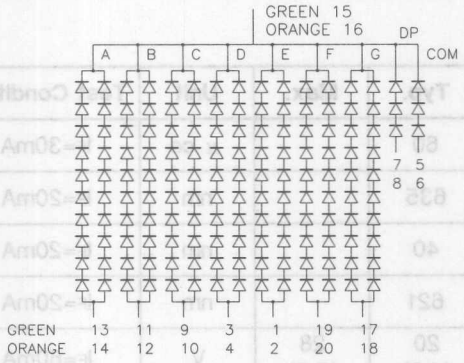
A.LTS-50301



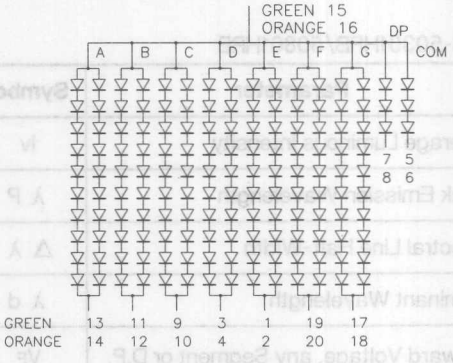
B.LTS-50801



C.LTS-50302A



D.LTS-50802A



Notes:20 chips green & 20 chips orange in one segment.

Absolute Maximum Rating at Ta=25 ℃

Parameter	50x01		50x02A		Unit
	Green	Hi.-Eff.Red	Green	Orange	
Power Dissipation Per Segment	1200	1200	900	900	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	180	180	160	160	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	60 0.72	60 0.72	40 0.48	40 0.48	mA mA/ ℃
Reverse Voltage Per Segment	50	50	50	50	V
Operating Temperature Range	-35 ℃ to +85 ℃				
Storage Temperature Range	-35 ℃ to +85 ℃				
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃					

Electrical/Optical Characteristics at Ta=25 ℃

LTS-50301G/50801G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	21	60		μ cd	IF=30mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, per Segment or D.P.	VF		21 (4.2)	28 (5.6)	V	IF=60mA
Reverse Current, per Segment or D.P.	IR			300	μ A	VR=50V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-50301HRB/50801HRB

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	21	60		μ cd	IF=30mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		20 (4.0)	28 (5.6)	V	IF=60mA
Reverse Current, any Segment or D.P.	IR			300	μ A	VR=50V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-50302A/50802A(ORANGE)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	13	40		μ cd	IF=20mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, per Segment or D.P.	VF		20 (4.0)	28 (56)	V	IF=40mA
Reverse Current, per Segment or D.P.	IR			200	μ A	VR=50V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-50302A/50802A(GREEN)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	13	40		μ cd	IF=20mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		21 (6.3)	28 (8.4)	V	IF=40mA
Reverse Current, any Segment or D.P.	IR			200	μ A	VR=50V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperature Unless Otherwise Noted)

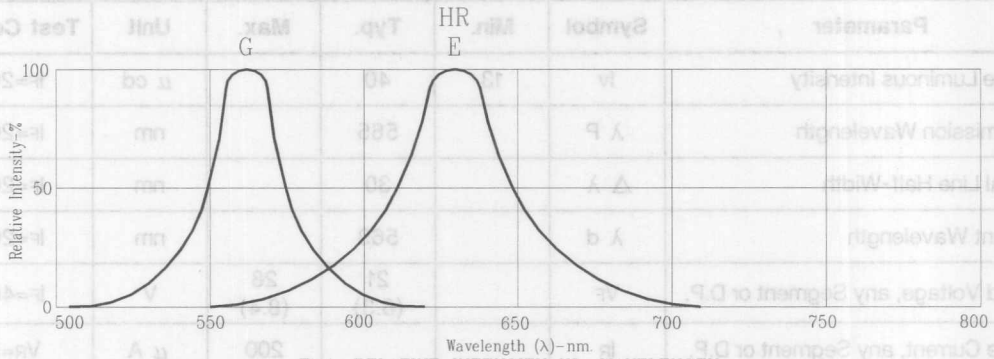


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

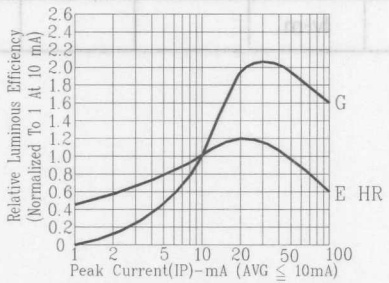


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

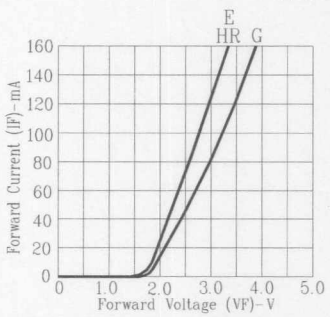


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

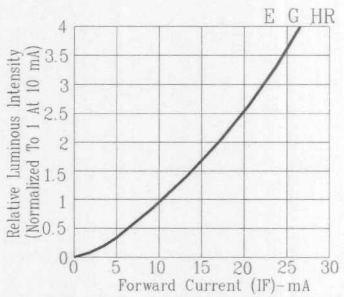


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

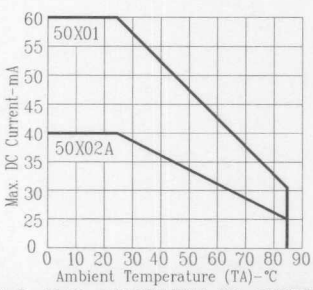


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

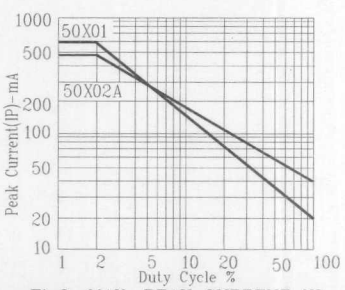


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN E=ORANGE HR=HI.EFF.RED (REFRESH RATE 1KHz)

LITEON

0.28" Seven-Segment Numeric LED Display

LTS-2X01A
LTD-2000 Series
LTC-2000

Features

- 0.28 inch (7.0mm) digit height
- Choices of five bright colors-red/bright red/green/yellow/orange.
- Low power requirement.
- Excellent characters appearance.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Descriptions

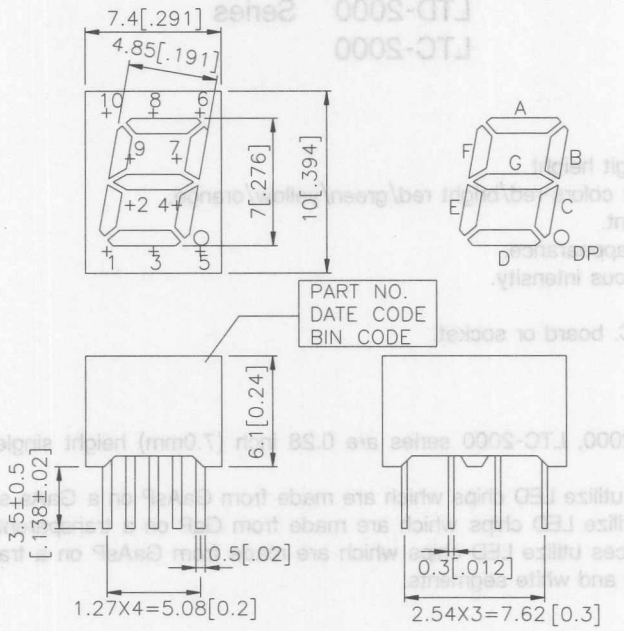
The LTS-2X01A, LTD-2000, LTC-2000 series are 0.28 inch (7.0mm) height single, dual, triple and quadruple digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow and orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. All devices have gray face and white segments.

Devices

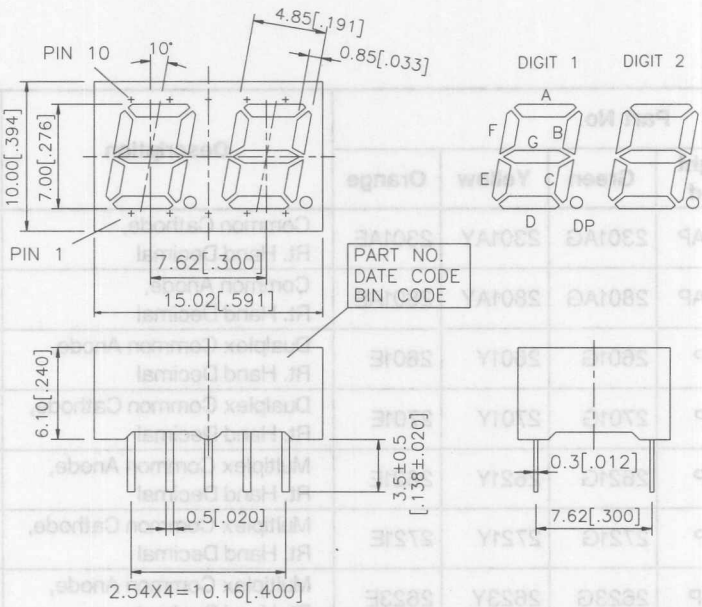
Part No.					Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange			
LTS-2301AR	2301AP	2301AG	2301AY	2301AE	Common Cathode, Rt. Hand Decimal	A	A
LTS-2801AR	2801AP	2801AG	2801AY	2801AE	Common Anode, Rt. Hand Decimal	A	B
LTD-2601R	2601P	2601G	2601Y	2601E	Dualplex Common Anode, Rt. Hand Decimal	B	C
LTD-2701R	2701P	2701G	2701Y	2701E	Dualplex Common Cathode, Rt. Hand Decimal	B	D
LTC-2621R	2621P	2621G	2621Y	2621E	Multiplex Common Anode, Rt. Hand Decimal	C	E
LTC-2721R	2721P	2721G	2721Y	2721E	Multiplex Common Cathode, Rt. Hand Decimal	C	F
LTC-2623R	2623P	2623G	2623Y	2623E	Multiplex Common Anode, Rt. Hand Decimal	D	G
LTC-2723R	2723P	2723G	2723Y	2723E	Multiplex Common Cathode, Rt. Hand Decimal	D	H

Package Dimensions

A.LTS-2301A/2801A

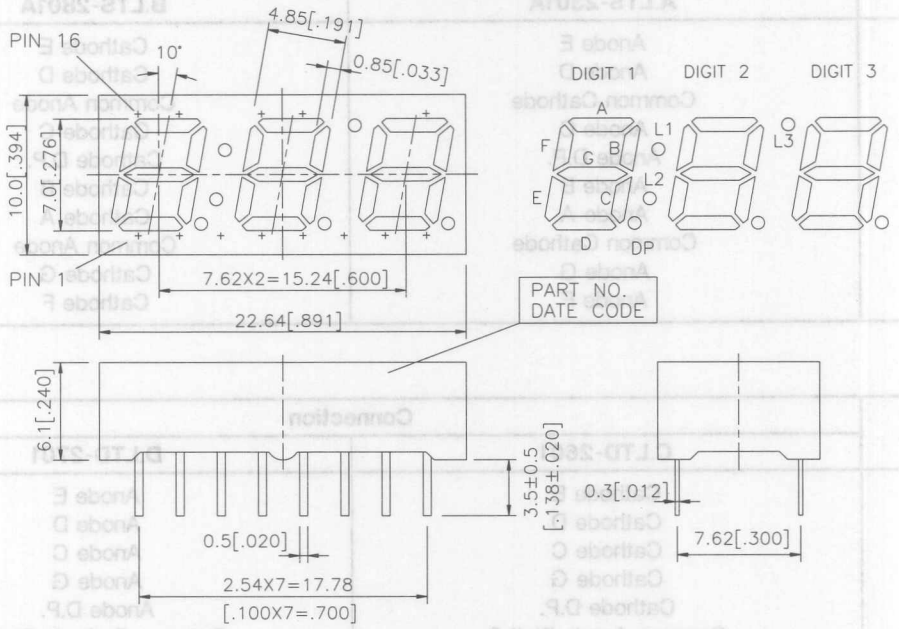


B.LTD-2601/2701

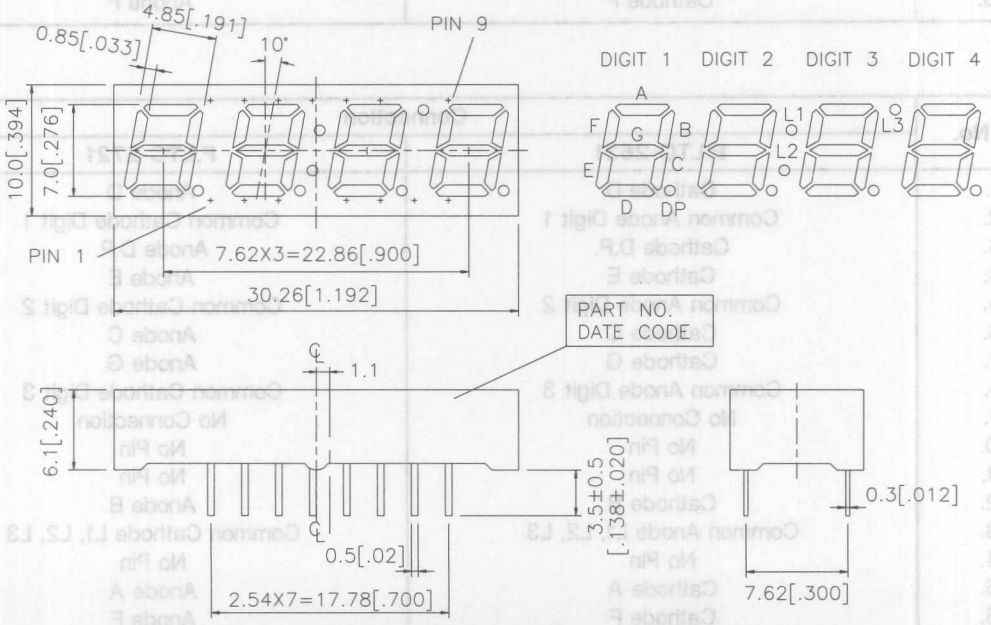


Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

C.LTC-2621/2721



D.LTC-2623/2723



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Pin Connection

Pin No.	Connection	
	A.LTS-2301A	B.LTS-2801A
1.	Anode E	Cathode E
2.	Anode D	Cathode D
3.	Common Cathode	Common Anode
4.	Anode C	Cathode C
5.	Anode D.P.	Cathode D.P.
6.	Anode B	Cathode B
7.	Anode A	Cathode A
8.	Common Cathode	Common Anode
9.	Anode G	Cathode G
10.	Anode F	Cathode F

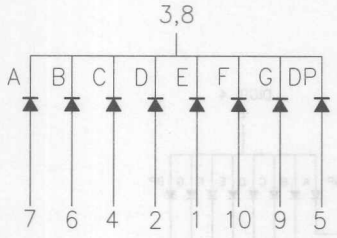
Pin No.	Connection	
	C.LTD-2601	D.LTD-2701
1.	Cathode E	Anode E
2.	Cathode D	Anode D
3.	Cathode C	Anode C
4.	Cathode G	Anode G
5.	Cathode D.P.	Anode D.P.
6.	Common Anode Digit 2	Common Cathode Digit 2
7.	Cathode A	Anode A
8.	Cathode B	Anode B
9.	Common Anode Digit 1	Common Cathode Digit 1
10.	Cathode F	Anode F

Pin No.	Connection	
	E.LTC-2621	F.LTC-2721
1.	Cathode D	Anode D
2.	Common Anode Digit 1	Common Cathode Digit 1
3.	Cathode D.P.	Anode D.P.
4.	Cathode E	Anode E
5.	Common Anode Digit 2	Common Cathode Digit 2
6.	Cathode C	Anode C
7.	Cathode G	Anode G
8.	Common Anode Digit 3	Common Cathode Digit 3
9.	No Connection	No Connection
10.	No Pin	No Pin
11.	No Pin	No Pin
12.	Cathode B	Anode B
13.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
14.	No Pin	No Pin
15.	Cathode A	Anode A
16.	Cathode F	Anode F

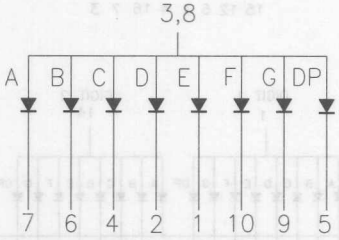
Pin No.	Connetcion	
	G.LTC-2623	H.LTC-2723
1.	Common Anode Digit 1	Common Cathode Digit 1
2.	Cathode C, L3	Anode C, L3
3.	Cathode D.P.	Anode D.P.
4.	No Connection	No Connection
5.	Cathode E	Anode E
6.	Cathode D	Anode D
7.	Cathode G	Anode G
8.	Common Anode Digit 4	Common Cathode Digit 4
9.	No Connection	No Connection
10.	No Pin	No Pin
11.	Common Anode Digit 3	Common Cathode Digit 3
12.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
13.	Cathode A, L1	Anode A, L1
14.	Common Anode Digit 2	Common Cathode Digit 2
15.	Cathode B, L2	Anode B, L2
16.	Cathode F	Anode F

Internal Circuit Diagrams

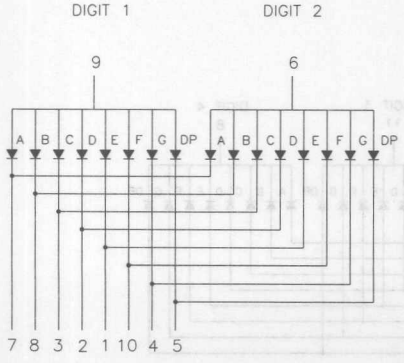
A.LTS-2301A



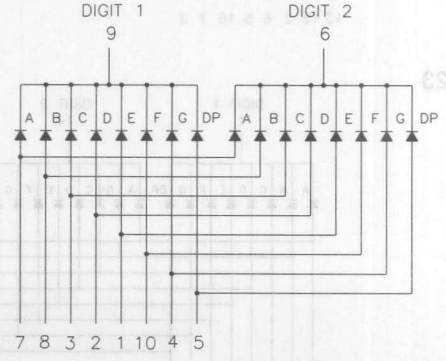
B.LTS-2801A



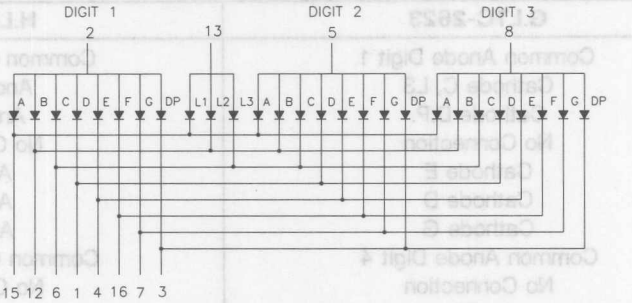
C.LTD-2601



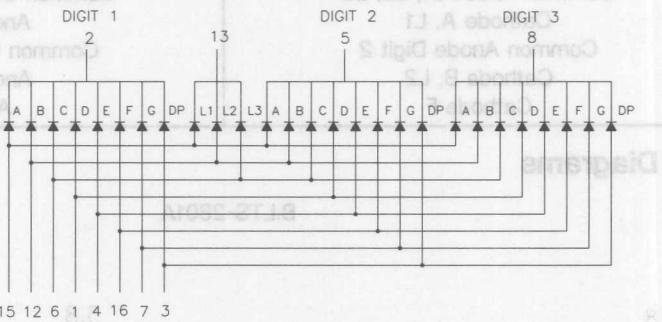
D.LTD-2701



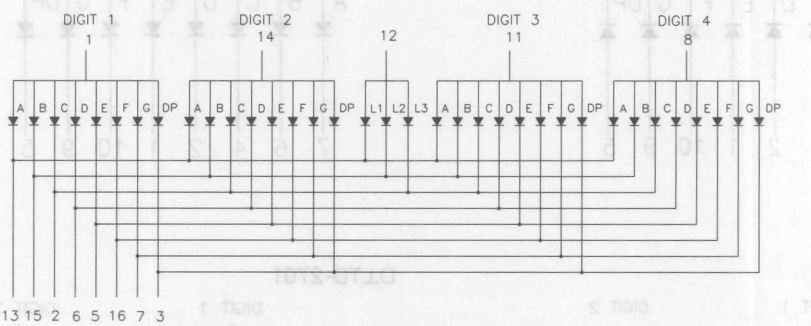
E.LTC-2621



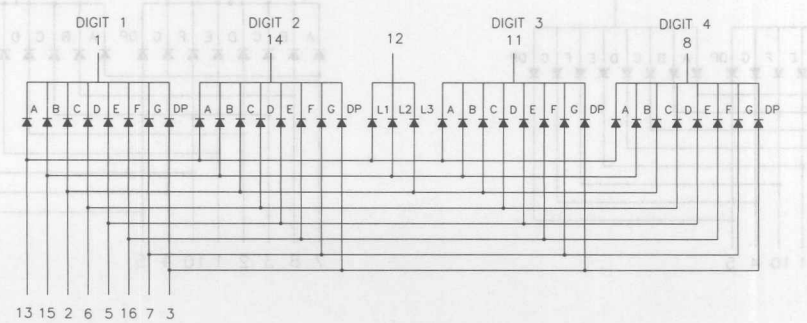
F.LTC-2721



G.LTC-2623



H.LTC-2723



Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	BrightRed	Green	Yellow	Orange	Unit
Power Dissipation Per Segment	55	40	75	60	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.2	25 0.33	20 0.27	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃					
Storage Temperature Range	-35 ℃ to +85 ℃					
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃						

Electrical/Optical Characteristics at Ta=25 ℃

LTS-2301AR/2801AR/LTD-2601R/2710R/LTC-2621R/2721R/2623R/2723R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	125	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-2301AP/2801AP/LTD-2601P/2710P/LTC-2621P/2721P/2623P/2723P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	750		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Electrical/Optical characteristics at Ta=25 ℃

LTS-2301AG/2801AG/LTD-2601G/2701G/LTC-2621G/2721G/2623G/2723G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-2301AY/2801AY/LTD-2601Y/2701Y/LTC-2621Y/2721Y/2623Y/2723Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-2301AE/2801AE/LTD-2601E/2701E/LTC-2621E/2721E/2623E/2723E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

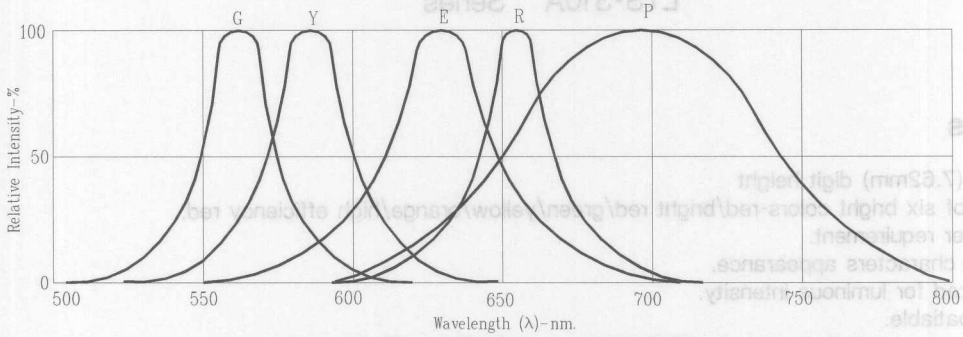


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

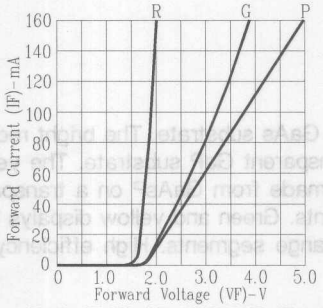


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

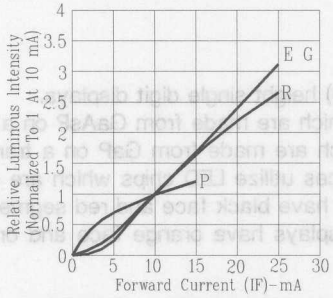


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

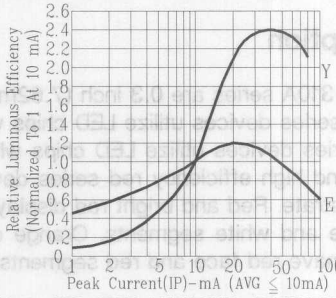


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

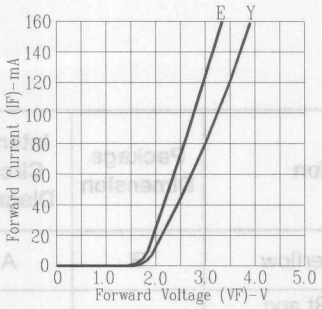


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

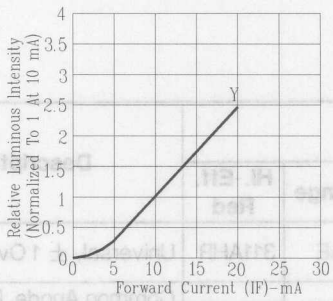


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

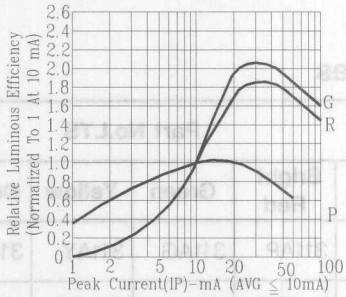


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

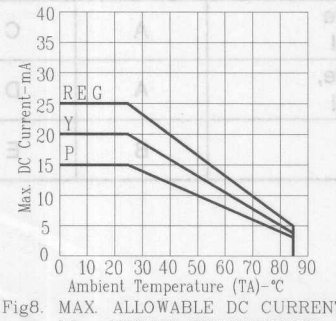


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

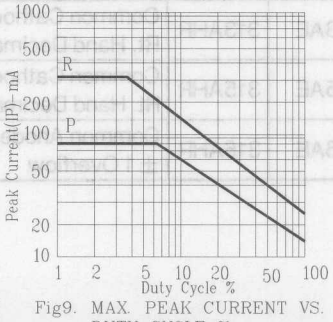


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

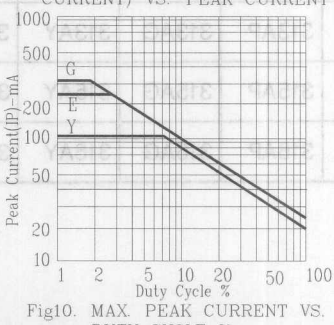


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE (REFRESH RATE 1KHz)

SEVEN-SEGMENT LED DISPLAYS

LITEON

0.3" Single Digit Numeric LED Displays

LTS-310A Series

Features

- 0.3 inch (7.62mm) digit height
- Choices of six bright colors-red/bright red/green/yellow/orange/high efficiency red.
- Low power requirement.
- Excellent characters appearance.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

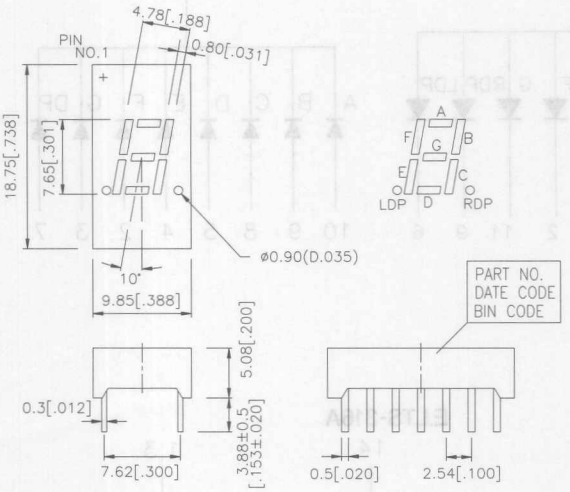
The LTS-310A series are 0.3 inch (7.62mm) height single digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow, orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red and bright red displays have black face and red segments. Green and yellow dispalys have gray face and white segments. Orange displays have orange face and orange segments. High efficiency red displays have red face and red segments.

Devices

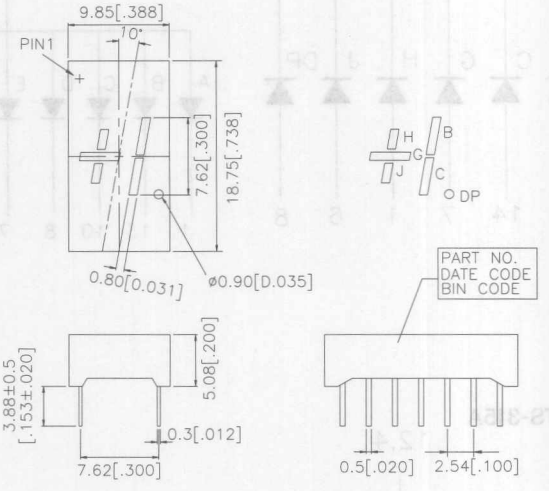
Part No.LTS						Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange	Hi.-Eff. Red			
311AR	311AP	311AG	311AY	311AE	311AHR	Universal, ± 1 Overflow	B	A
312AR	312AP	312AG	312AY	312AE	312AHR	Common Anode, Rt.and Lt. Hand Decimal	A	B
313AR	313AP	313AG	313AY	313AE	313AHR	Common Cathode Rt. Hand Decimal	A	C
315AR	315AP	315AG	315AY	315AE	315AHR	Common Cathode, Rt. Hand Decimal	A	D
316AR	316AP	316AG	316AY	316AE	316AHR	Common Anode, ± 1 Overflow	B	E

Package Dimensions

A. LTS-312A/313A/315A



B. LTS-311A/316A



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

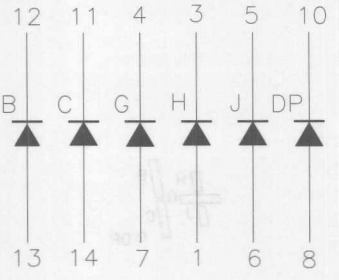
Pin Connection

Pin No.	Connection				
	A.LTS-311A	B.LTS-312A	C.LTS-313A	D.LTS-315A	E.LTS-316A
1.	Anode H	Cathode A	Common Cathode *2	Anode F	Anode G,H&J *4
2.	No Pin	Cathode F	Anode F	Anode G	No Pin
3.	Cathode H	Common Anode *1	Anode G	No Pin	Anode G,H&J *4
4.	Cathode G	No Pin	Anode E	Common Cathode *3	No Pin
5.	Cathode J	No Pin	Anode D	No Pin	No Pin
6.	Anode J	Cathode L.D.P.	Common Cathode *2	Anode E	No Pin
7.	Anode G	Cathode E	Anode D.P.	Anode D	Cathode H&J
8.	Anode D.P.	Cathode D	Anode C	Anode C	Cathode G
9.	No Pin	Cathode R.D.P.	Anode B	Anode D.P.	No Connection
10.	Cathode D.P.	Cathode C	Anode A	No Pin	Cathode C
11.	Cathode C	Cathode G	-	No Pin	Cathode B
12.	Cathode B	No Pin	-	Common Cathode *3	No Pin
13.	Anode B	Cathode B	-	Anode B	No Pin
14.	Anode C	Common Anode *1	-	Anode A	Anode B&C

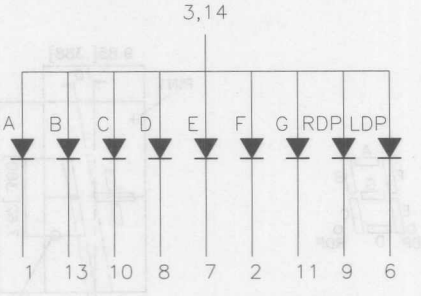
Notes: 1.Pin 3 & 14 are internally connected. 3.Pin 4 & 12 are internally connected.
2.Pin 1 & 6 are internally connected. 4.Pin 1 & 3 are internally connected.

Internal Circuit Diagrams

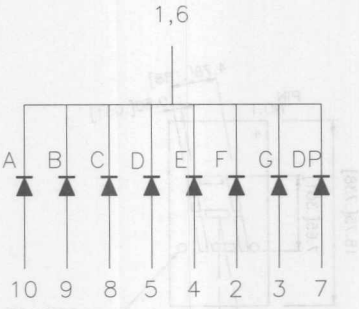
A.LTS-311A



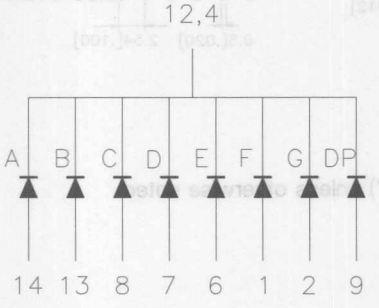
B.LTS-312A



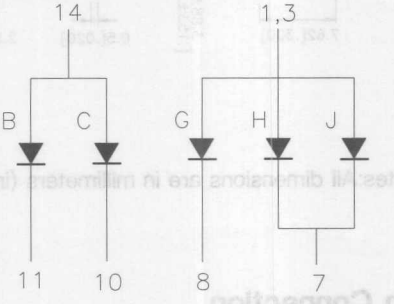
C.LTS-313A



D.LTS-315A



E.LTS-316A



Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Hi.-EFF. Red	Unit
Power Dissipation Per Segment	55	40	75	60	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.2	25 0.33	20 0.27	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃						
Storage Temperature Range	-35 ℃ to +85 ℃						
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃							

Electrical/Optical Characteristics at Ta=25 ℃

LTS-310AR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	210	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-310AP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	340	750		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-310AG

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-310AY

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-310AE

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-310AHR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

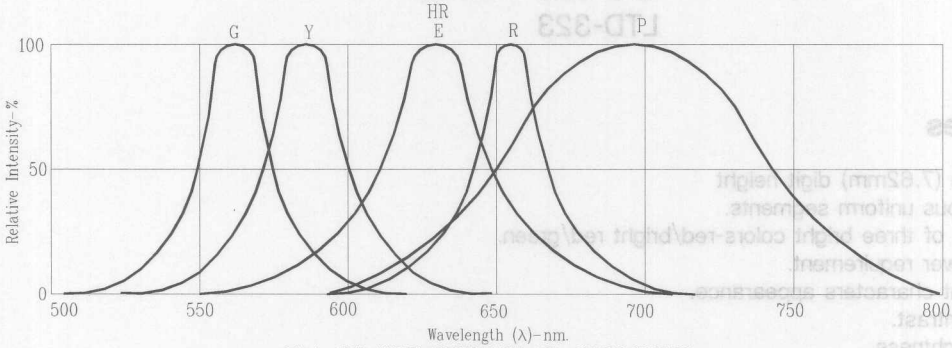


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

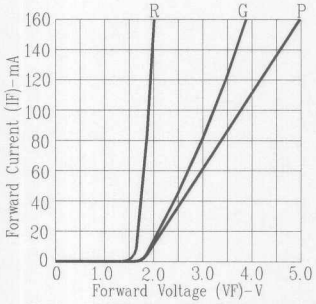


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

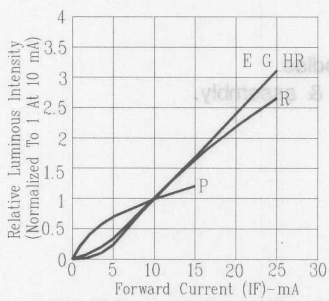


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

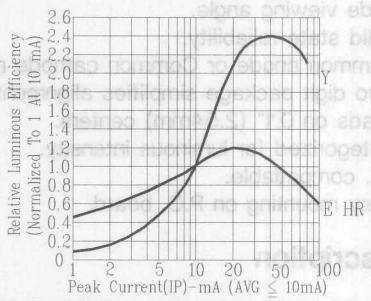


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

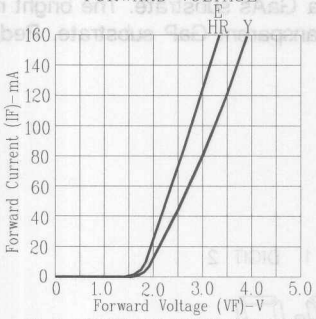


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

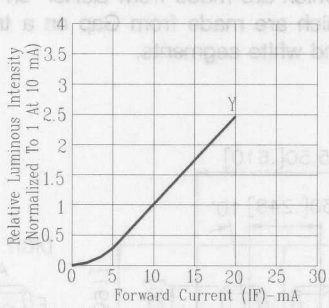


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

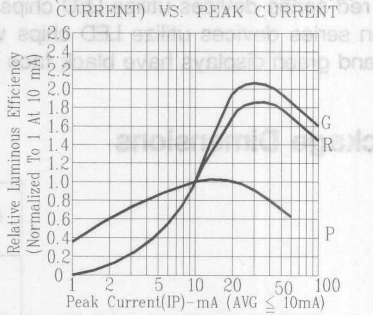


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

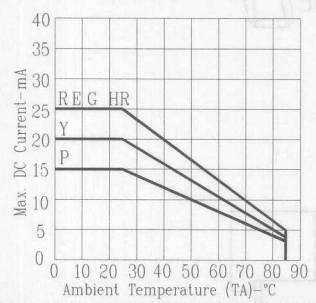


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

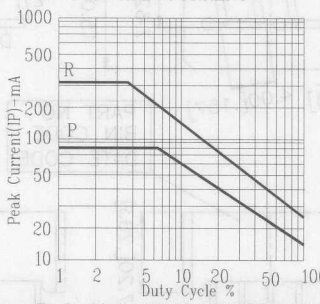


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

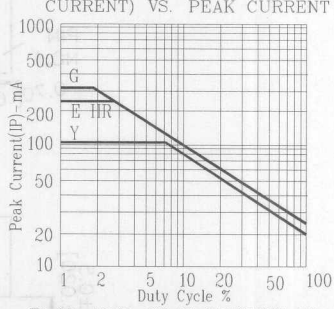


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE HR=HI.-EFF.RED (REFRESH RATE 1KHz)

LITEON

0.3" Daul Digit Numeric LED Displays

LTD-322 Series
LTD-323

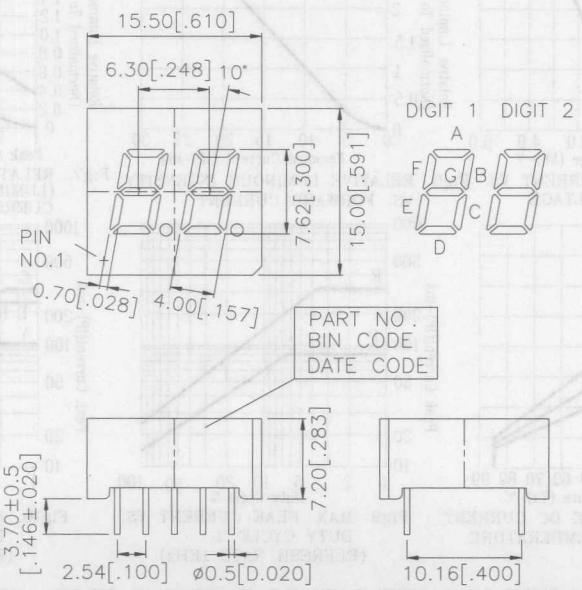
Features

- 0.3 inch (7.62mm) digit height
- Continuous uniform segments.
- Choices of three bright colors-red/bright red/green.
- Low power requirement.
- Excellent characters appearance.
- High contrast.
- High brightness.
- Wide viewing angle.
- Solid state reliability.
- Common anode or Common cathode modles.
- Two digit package simplifies alignments & assembly.
- Leads on 0.1" (2.54mm) centers.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board.

Description

The LTD-322/323 series are 0.3 inch (7.62mm) height dual digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from Gap on a transparent GaP substrate. Red, bright red and green displays have black face and white segments.

Package Dimensions



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

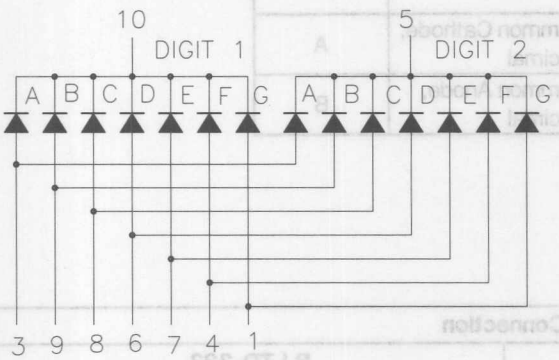
Part No. LTD-			Description	Internal Circuit Diagram
Red	Bright Red	Green		
322R	322P	322G	Dualplex Common Cathode, Rt. Hand Decimal	A
323R	323P	323G	Dualplex Common Anode, Rt. Hand Decimal	B

Pin Connection

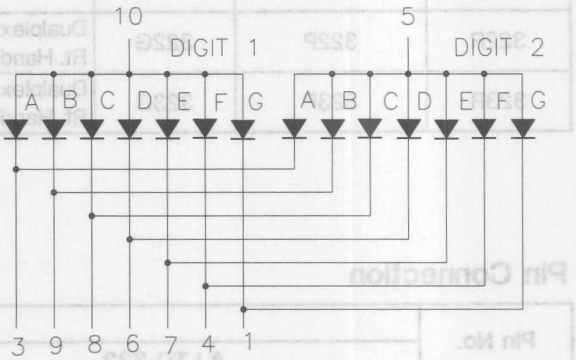
Pin No.	Connection	
	A.LTD-322	B.LTD-323
1.	Anode G	Cathode G
2.	No Pin	No Pin
3.	Anode A	Cathode A
4.	Anode F	Cathode F
5.	Common Cathode (Digit 2)	Common Anode (Digit 2)
6.	Anode D	Cathode D
7.	Anode E	Cathode E
8.	Anode C	Cathode C
9.	Anode B	Cathode B
10.	Common Cathode (Digit 1)	Common Anode (Digit 1)

Internal Circuit Diagrams

A.LTD-322



B.LTD-323



Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Unit
Power Dissipation Per Segment	55	40	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.20	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical/Optical Characteristics at Ta=25 ℃

LTD-322R/323R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	70	400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTD-322P/323P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	210	650		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTD-322G/323G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	540	1600		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

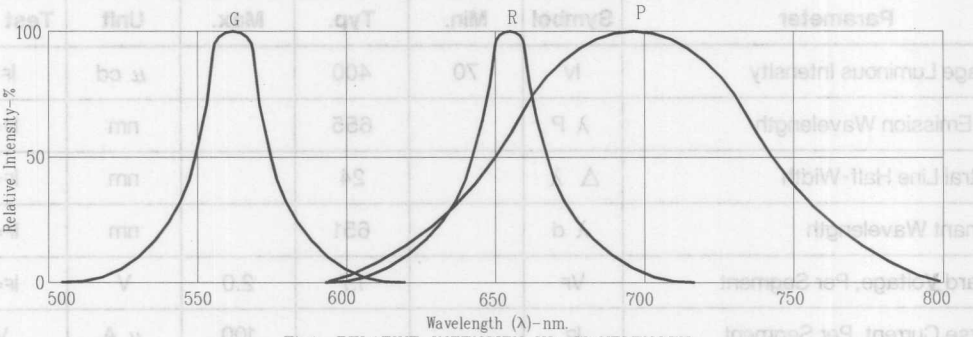


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

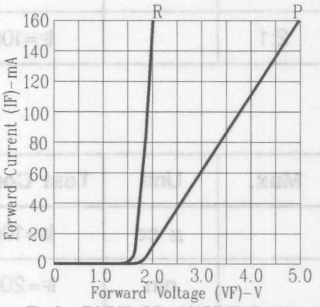


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

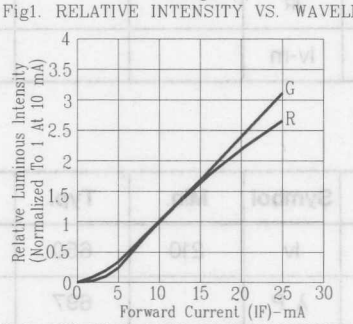


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

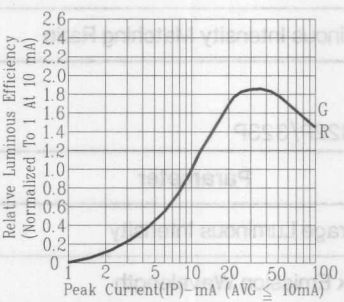


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

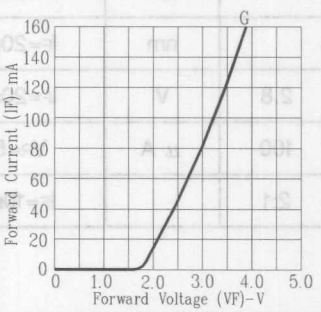


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

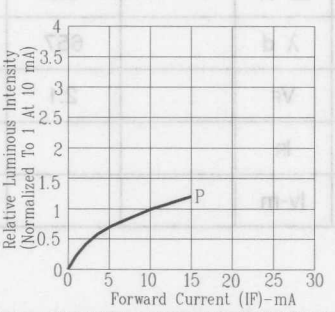


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

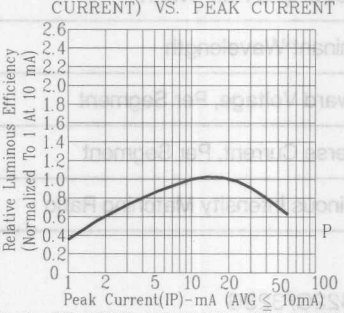


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

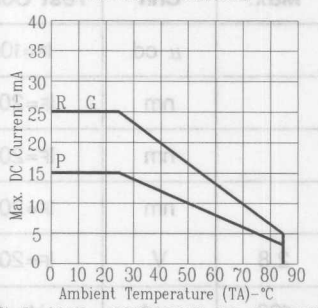


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

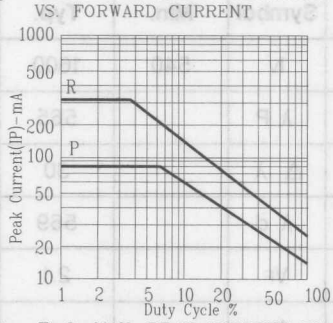


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

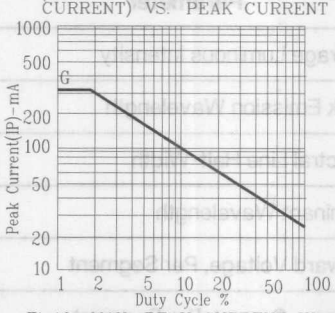


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN (REFRESH RATE 1KHz)

0.36" Single Digit Numeric LED Displays

LTS-360 Series

Features

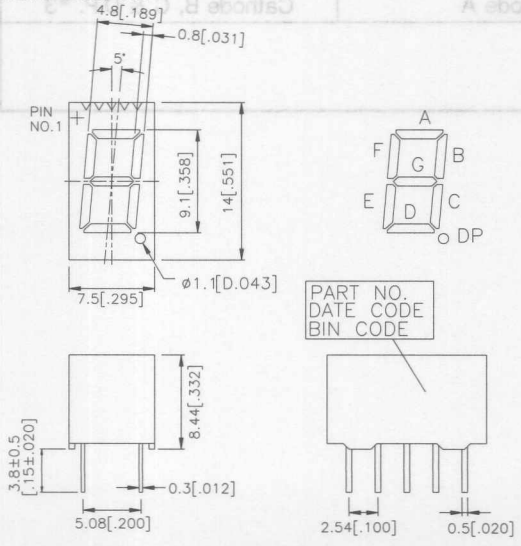
- 0.36 inch (9.14mm) digit height
- Continuous uniform segments.
- Choices of five bright colors-red/bright red/green/orange/high efficiency red.
- Low power requirement.
- Excellent characters appearance.
- High brightness.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board.

Description

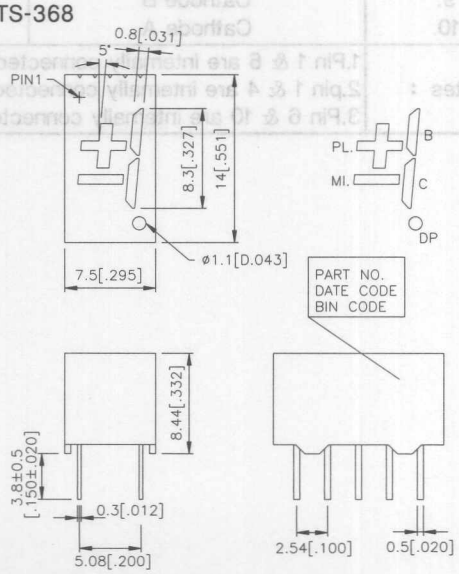
The LTS-360 series are 0.36 inch (9.14mm) height single digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from Gap on a transparent GaP substrate. The orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red, bright red and high efficiency red displays have red face and red segments. Green and orange displays have gray face and white segments.

Package Dimensions

A.LTS-360/367



B.LTS-368



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

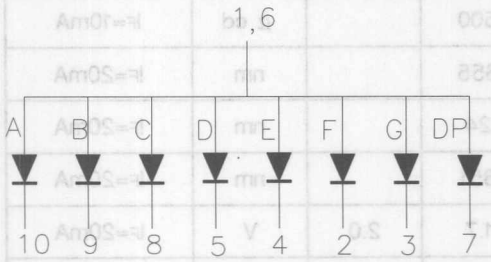
Part No LTS-.					Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Orange	Hi.-EFF. Red			
360R	360P	360G	360E	360HR	Common Anode, Rt. Hand Decimal	A	A
367R	367P	367G	367E	367HR	Common Cathode, Rt. Hand Decimal	A	B
368R	368P	368G	368E	368HR	Common Cathode, ± 1 Overflow	B	C

Pin Connection

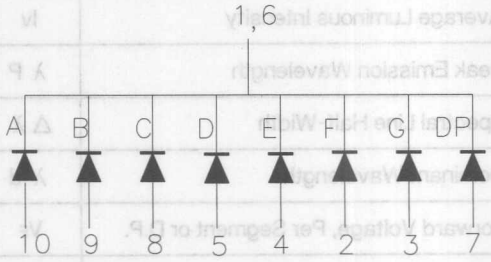
Pin No.	Connection		
	A.LTS-360	B.LTS-367	C.LTS-368
1.	Common Anode *1	Common Cathode *1	Cathode Pl. & Mi. *2
2.	Cathode F	Anode F	Anode Plus Sign
3.	Cathode G	Anode G	Anode Minus Sign
4.	Cathode E	Anode E	Cathode Pl. & Mi. *2
5.	Cathode D	Anode D	No Pin
6.	Common Anode *1	Common Cathode *1	Cathode B, C & D.P. *3
7.	Cathode D.P.	Anode D.P.	Anode D.P.
8.	Cathode C	Anode C	Anode C
9.	Cathode B	Anode B	Anode B
10.	Cathode A	Anode A	Cathode B, C & D.P. *3
Notes :	1.Pin 1 & 6 are internally connected. 2.pin 1 & 4 are internally connected. 3.Pin 6 & 10 are internally connected.		

Internal Circuit Diagrams

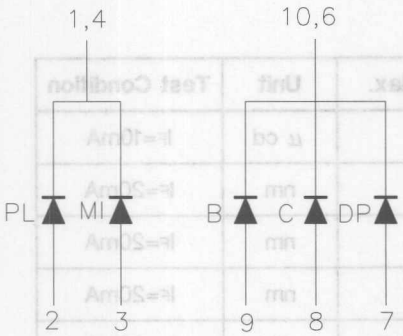
A.LTS-360



B.LTS-367



C.LTS-368



Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Orange	HI.-EFF. Red	Unit
Power Dissipation Per Segment	55	40	75	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	100	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.20	25 0.33	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃					
Stroage Temperature Range	-35 ℃ to +85 ℃					
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃						

Electrical/Optical Characteristics at Ta=25 ℃

LTS-360R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-360P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	750		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-360G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-360E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-360HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

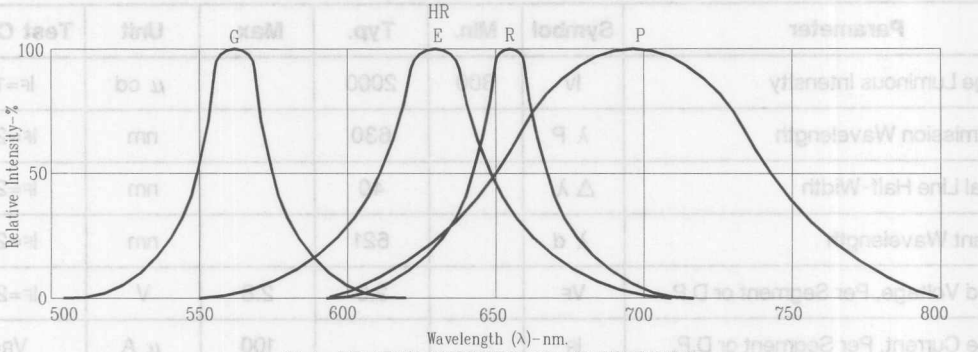


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

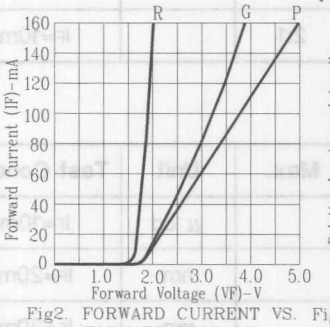


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

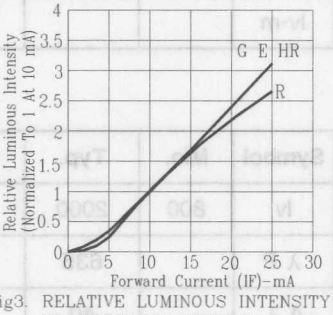


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

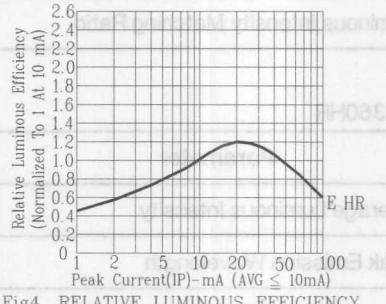


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

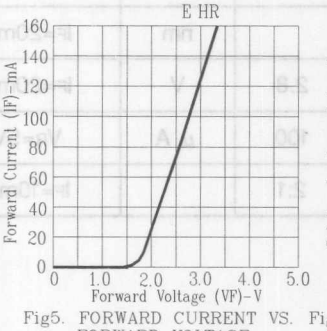


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

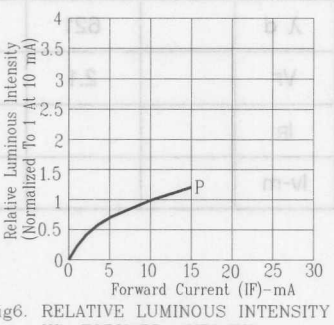


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

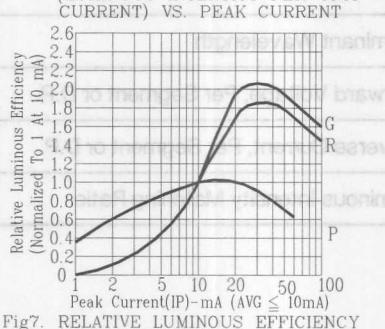


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

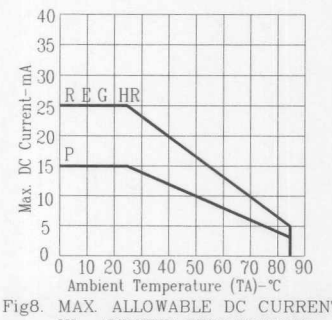


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

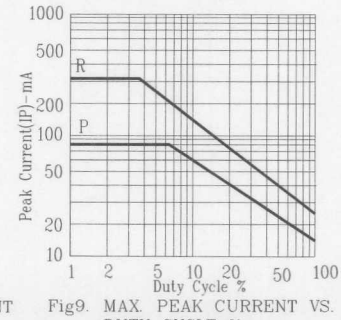


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

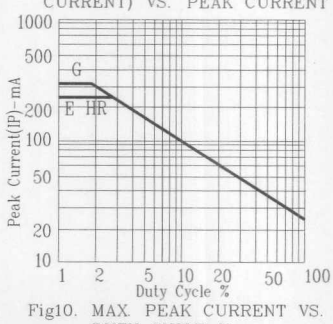


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN E=ORANGE HR=HI-EFF.RED (REFRESH RATE 1KHz)

LITEON

0.4" Seven-Segment Numeric LED Display

LTS-4X01A
LTD-4000 Series
LTC-4000

Features

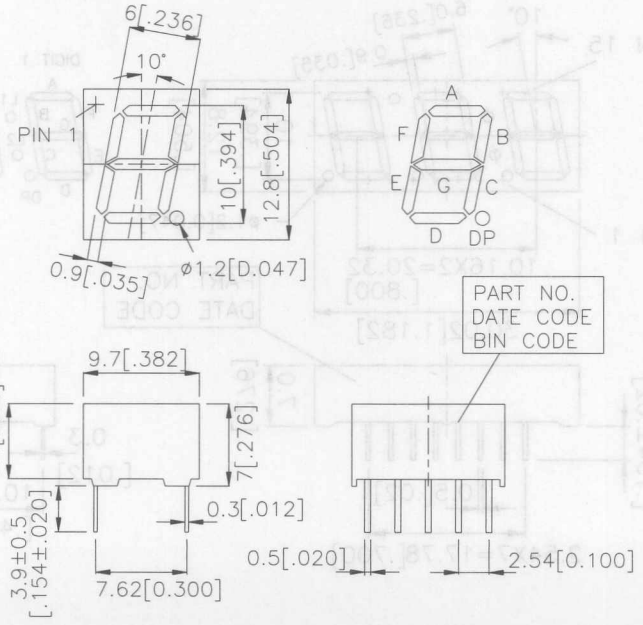
- 0.4 inch (10.0mm) digit height
- Choices of five bright colors: red/bright red/green/yellow/orange.
- Low power requirement.
- Excellent characters appearance.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

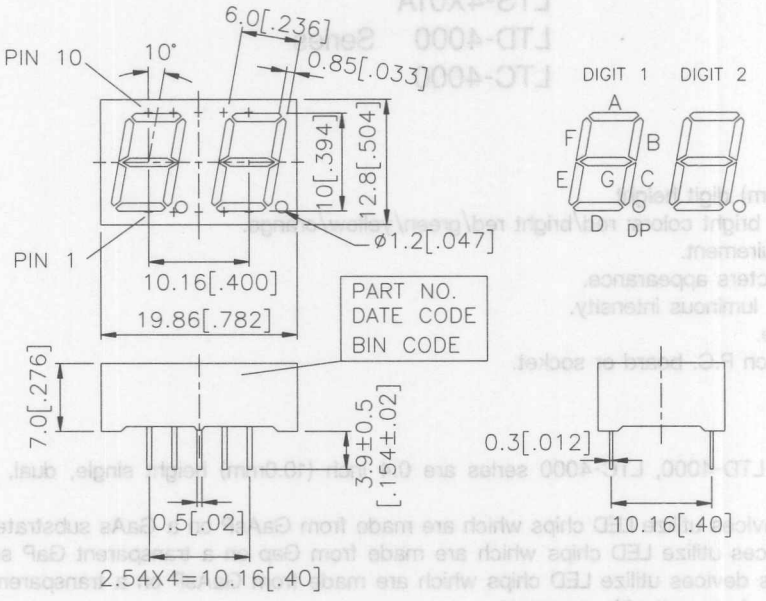
The LTS-4X01A, LTD-4000, LTC-4000 series are 0.4 inch (10.0mm) height single, dual, triple and quadruple digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from Gap on a transparent GaP substrate. The yellow and orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. All devices have gray face and white segments.

Package Dimensions

A.LTS-4301/4801

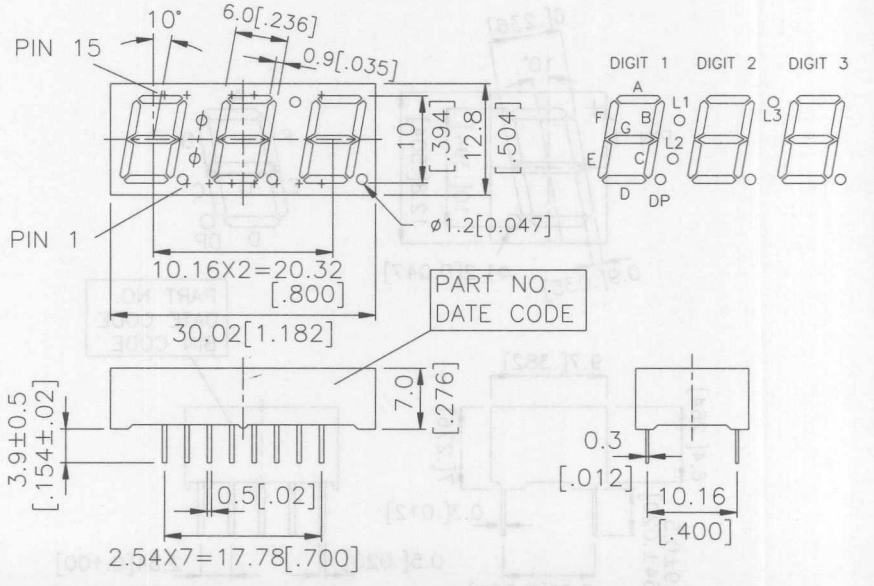


B.LTD-4608/4708

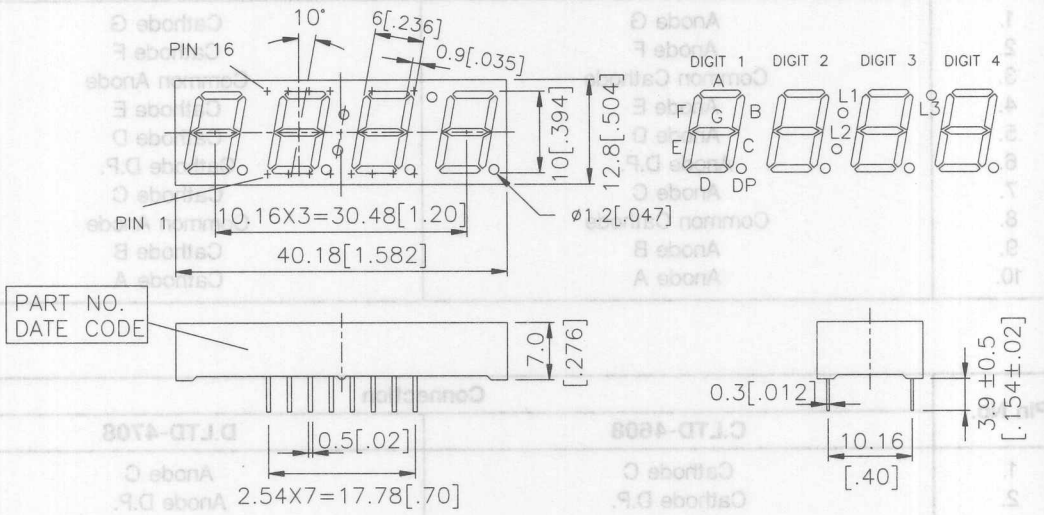


Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

C.LTC-4624/4724



D.LTC-4627/4727



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No.					Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange			
LTS-4301R	4301P	4301G	4301Y	4301E	Common Cathode, Rt. Hand Decimal	A	A
LTS-4801R	4801P	4801G	4801Y	4801E	Common Anode, Rt. Hand Decimal	A	B
LTD-4608R	4608P	4608G	4608Y	4608E	Dualplex Common Anode Rt. Hand Decimal	B	C
LTD-4708R	4708P	4708G	4708Y	4708E	Dualplex Common Cathode, Rt. Hand Decimal	B	D
LTC-4624R	4624P	4624G	4624Y	4624E	Multiplex Common Anode, Rt. Hand Decimal	C	E
LTC-4724R	4724P	4724G	4724Y	4724E	Multiplex Common Cathode, Rt. Hand Decimal	C	F
LTC-4627R	4627P	4627G	4627Y	4627E	Multiplex Common Anode, Rt. Hand Decimal	D	G
LTC-4727R	4727P	4727G	4727Y	4727E	Multiplex Common Cathode, Rt. Hand Decimal	D	H

Pin Connection

Pin No.	Connection	
	A.LTS-4301	B.LTS-4801
1.	Anode G	Cathode G
2.	Anode F	Cathode F
3.	Common Cathode	Common Anode
4.	Anode E	Cathode E
5.	Anode D	Cathode D
6.	Anode D.P.	Cathode D.P.
7.	Anode C	Cathode C
8.	Common Cathode	Common Anode
9.	Anode B	Cathode B
10.	Anode A	Cathode A

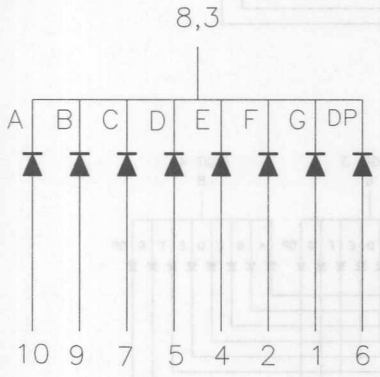
Pin No.	Connection	
	C.LTD-4608	D.LTD-4708
1.	Cathode C	Anode C
2.	Cathode D.P.	Anode D.P.
3.	Cathode E	Anode E
4.	Common Anode Digit 2	Common Cathode Digit 2
5.	Cathode D	Anode D
6.	Cathode F	Anode F
7.	Cathode G	Anode G
8.	Cathode B	Anode B
9.	Common Anode Digit 1	Common Cathode Digit 1
10.	Cathode A	Anode A

Pin No.	Connection	
	E.LTC-4624	F.LTC-4724
1.	Common Anode Digit 1	Common Cathode Digit 1
2.	Cathode E	Anode E
3.	Cathode C, L3	Anode C, L3
4.	Cathode D	Anode D
5.	Common Anode Digit 2	Common Cathode Digit 2
6.	Cathode D.P.	Anode D.P.
7.	Common Anode Digit 3	Common Cathode Digit 3
8.	Cathode G	Anode G
9.	No Pin	No Pin
10.	No Pin	No Pin
11.	Cathode B, L2	Anode B, L2
12.	Cathode A, L1	Anode A, L1
13.	No Pin	No Pin
14.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
15.	Cathode F	Anode F

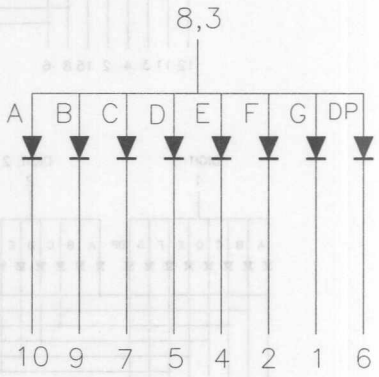
Pin No.	Connetcion	
	G.LTC-4627	H.LTC-4727
1.	Common Anode Digit 1	Common Cathode Digit 1
2.	Common Anode Digit 2	Common Cathode Digit 2
3.	Cathode D	Anode D
4.	Common Anode L1, L2, L3	Common Cathode L1, L2, L3
5.	Cathode E	Anode E
6.	Common Anode Digit 3	Common Cathode Digit 3
7.	Cathode D.P.	Anode D.P.
8.	Common Anode Digit 4	Common Cathode Digit 4
9.	No Connection	No Connection
10.	No Pin	No Pin
11.	Cathode F	Anode F
12.	No Pin	No Pin
13.	Cathode C, L3	Anode C, L3
14.	Cathode A, L1	Anode A, L1
15.	Cathode G	Anode G
16.	Cathode B, L2	Anode B, L2

Internal Circuit Diagrams

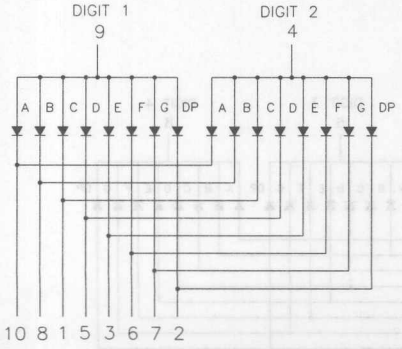
A.LTS-4301



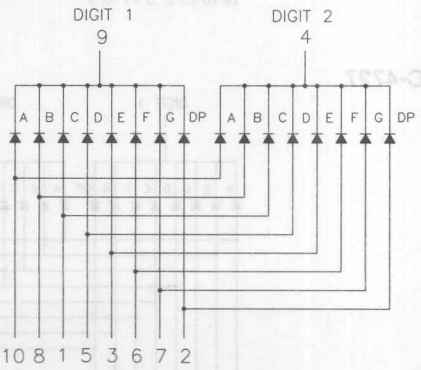
B.LTS-4801



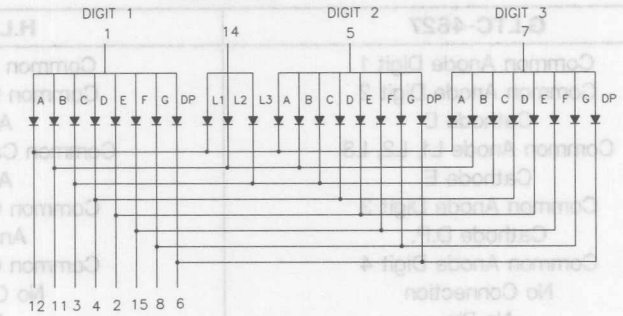
C.LTD-4608



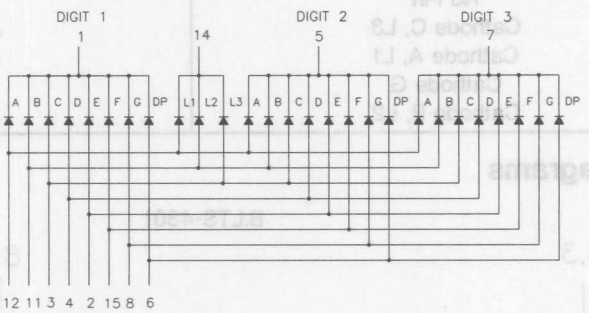
D.LTD-4708



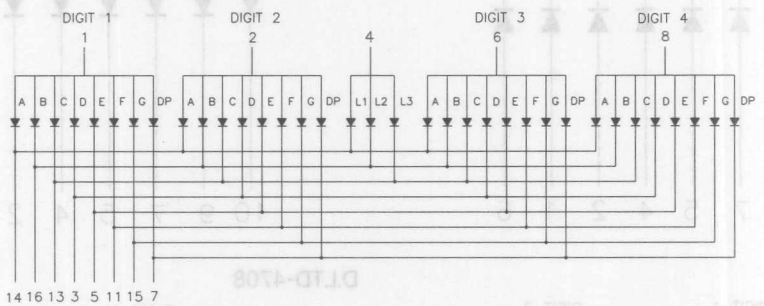
E.LTC-4624



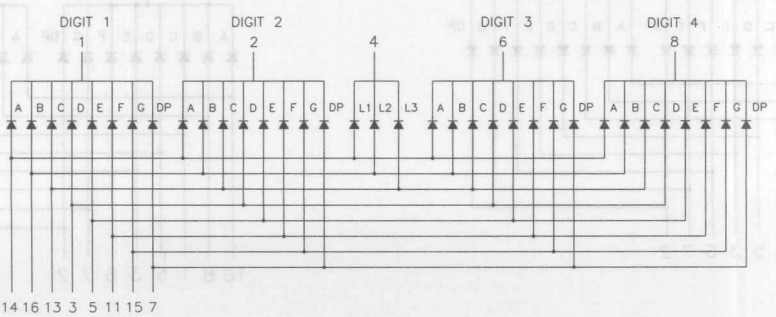
F.LTC-4724



G.LTC-4627



H.LTC-4727



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Unit
Power Dissipation Per Segment	55	40	75	60	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.2	25 0.33	20 0.27	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃					
Storage Temperature Range	-35 ℃ to +85 ℃					
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃						

Electrical/Optical Characteristics at Ta=25 ℃

LTS-4301R/4801R/LTD-4608R/4708R/LTC-4624R/4724R/4627R/4727R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4301P/4801P/LTD-4608P/4708P/LTC-4624P/4724P/4627P/4727P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	800		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4301G/4801G/LTD-4608G/4708G/LTC-4624G/4724G/4627G/4727G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4301Y/4801Y/LTD-4608Y/4708Y/LTC-4624Y/4724Y/4627Y/4727Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4301E/4801E/LTD-4608E/4708E/LTC-4624E/4724E/4627E/4727E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Notes:Luminous intensity is measured with a light sensor and filter combination that appoximates the CIE (Commission international DEL' clairage)eye-response curve.

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

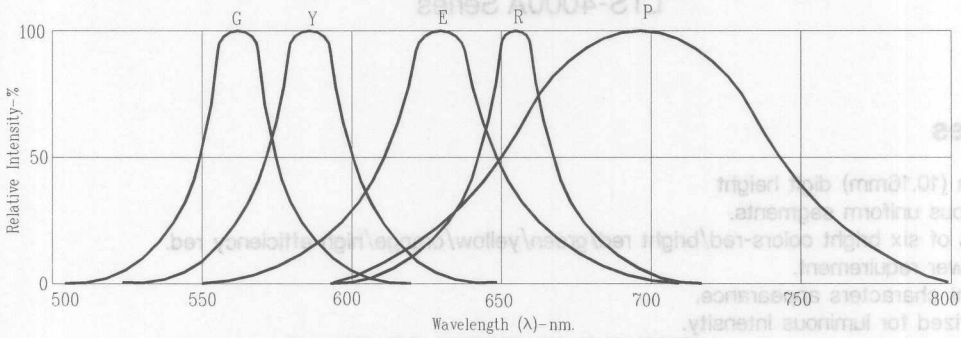


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

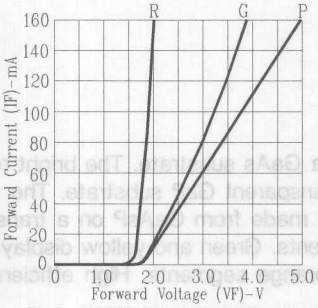


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

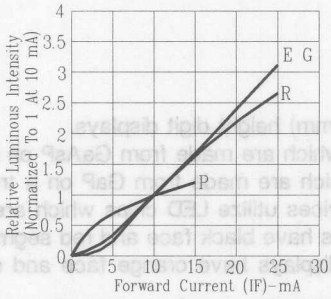


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

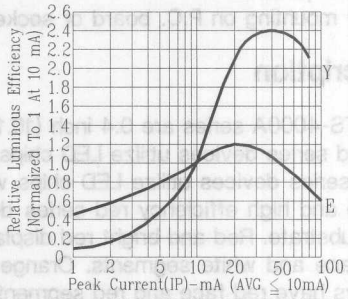


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

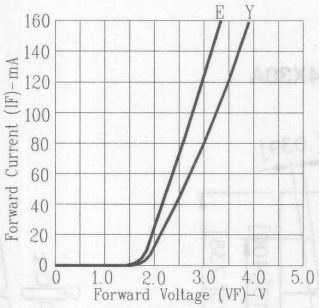


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

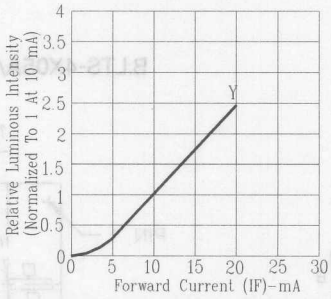


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

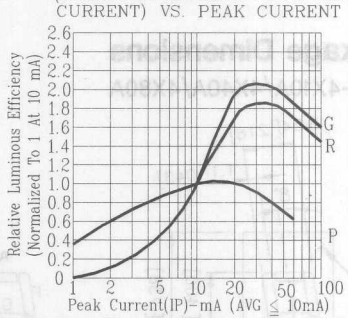


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

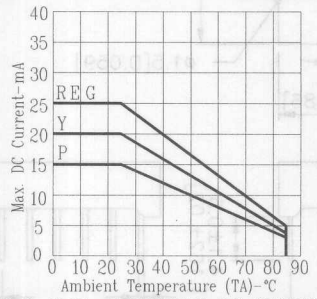


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

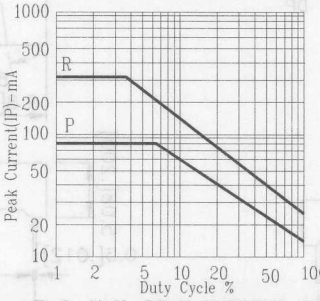


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

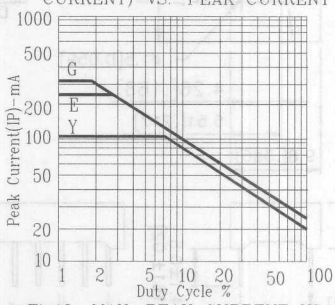


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE (REFRESH RATE 1KHz)

LITEON

0.4" Single Digit Numeric LED Displays

LTS-4000A Series

Features

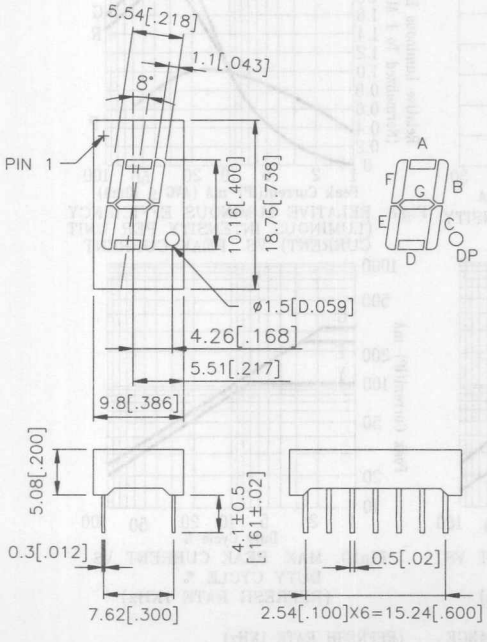
- 0.4 inch (10.16mm) digit height
- Continuous uniform segments.
- Choices of six bright colors-red/bright red/green/yellow/orange/high efficiency red.
- Low power requirement.
- Excellent characters appearance.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

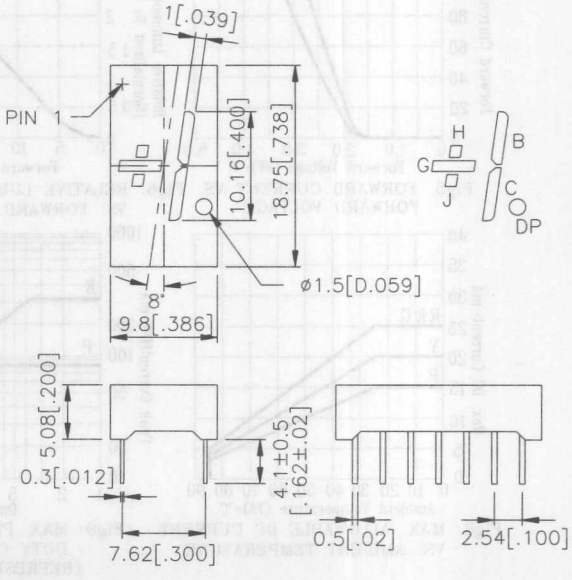
The LTS-4000A series are 0.4 inch (10.16mm) height digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow, orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red and bright red displays have black face and red segments. Green and yellow displays have gray face and white segments. Orange displays have orange face and orange segments. High efficiency red displays have red face and red segments.

Package Dimensions

A.LTS-4X10A/4X40A/4X80A



B.LTS-4X05A/4X30A



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No. LTS-						Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange	Hi.-EFF. Red			
4705AR	4705AP	4505AG	4805AY	4605AE	4905AHR	Universal, ±1 Overflow	B	A
4710AR	4710AP	4510AG	4810AY	4610AE	4910AHR	Common Anode, Rt. Hand Decimal	A	B
4730AR	4730AP	4530AG	4830AY	4630AE	4930AHR	Common Anode, ±1 Overflow	B	C
4740AR	4740AP	4540AG	4840AY	4640AE	4940AHR	Common Cathode, Rt. Hand Decimal	A	D
4780AR	4780AP	4580AG	4880AY	4680AE	4980AHR	Common Cathode, Rt. Hand Decimal	A	E

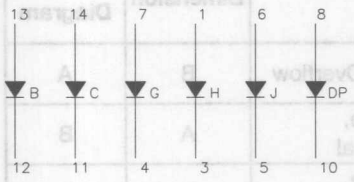
Pin Connection

Pin No.	Connection				
	A.LTS-4x05A	B.LTS-4x10A	C.LTS-4x30A	D.LTS-4x40A	E.LTS-4x80A
1.	Anode H	Cathode A	Anode G,H&J *2	Anode F	Common Cathode *4
2.	No Pin	Cathode F	No Pin	Anode G	Anode F
3.	Cathode H	Common Anode *1	Anode G,H&J *2	No Pin	Anode G
4.	Cathode G	No Pin	No Pin	Common Cathode *3	Anode E
5.	Cathode J	No Pin	No Pin	No Pin	Anode D
6.	Anode J	No Pin	No Connection	Anode E	Common Cathode *4
7.	Anode G	Cathode E	Cathode H&J	Anode D	Anode D.P.
8.	Anode D.P.	Cathode D	Cathode G	Anode C	Anode C
9.	No Pin	Cathode D.P.	Cathode D.P.	Anode D.P.	Anode B
10.	Cathode D.P.	Cathode C	Cathode C	No Pin	Anode A
11.	Cathode C	Cathode G	Cathode B	No Pin	-
12.	Cathode B	No Pin	No Pin	Common Cathode *3	-
13.	Anode B	Cathode B	No Pin	Anode B	-
14.	Anode C	Common Anode *1	Anode B, C&D.P.	Anode A	-

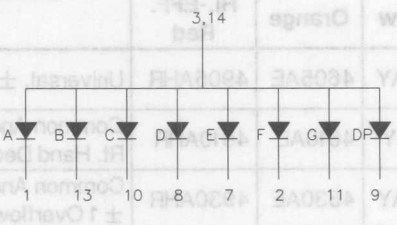
Notes: 1.Pin 3 & 14 are internally connected.
2.Pin 1 & 3 are internally connected.
3.Pin 4 & 12 are internally connected.
4.Pin 1 & 6 are internally connected.

Internal Circuit Diagrams

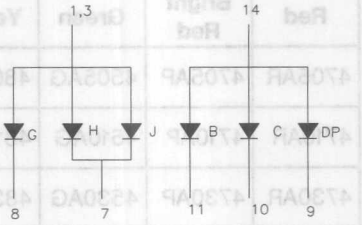
A、LTS-4X05A



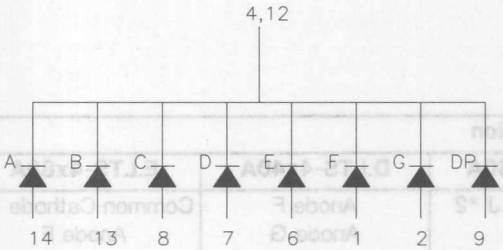
B、LTS-4X10A



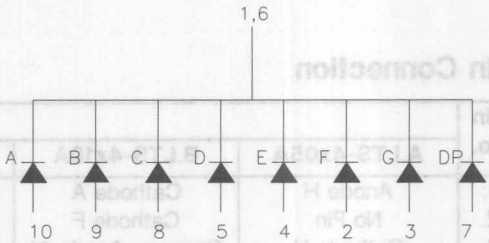
C、LTS-4X30A



D、LTS-4X40A



E、LTS-4X80A



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Hi.-EFF. Red	Unit
Power Dissipation Per Segment	55	40	75	60	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.2	25 0.33	20 0.27	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃						
Storage Temperature Range	-35 ℃ to +85 ℃						
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃							

Electrical/Optical Characteristics at Ta=25 ℃

LTS-4700AR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	210	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4700AP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	340	800		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4700AG

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4800AY

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4600AE

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-4900AHR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	870	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

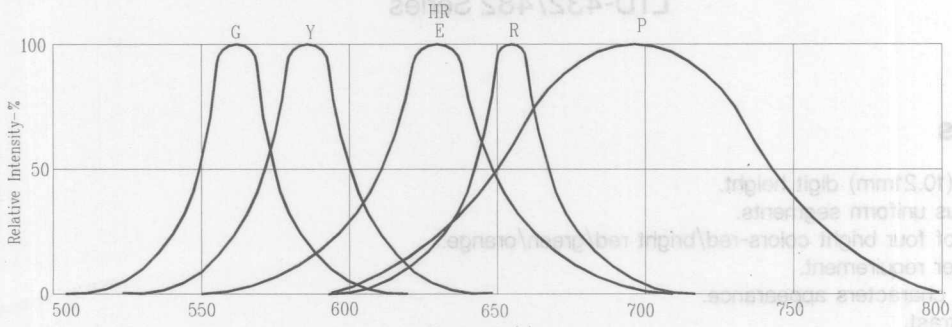


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

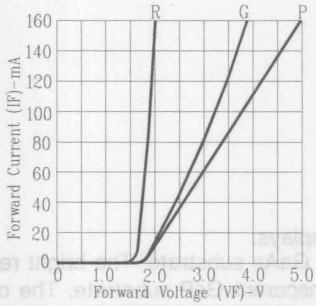


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

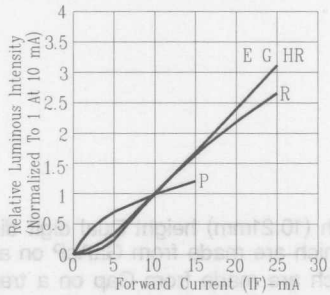


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

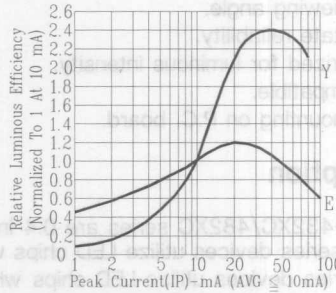


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

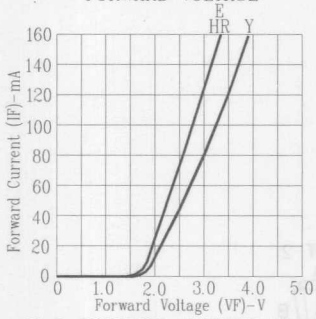


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

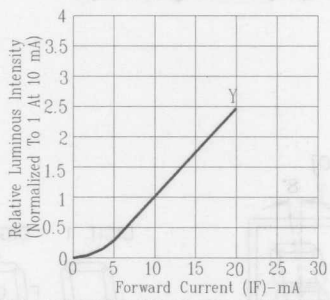


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

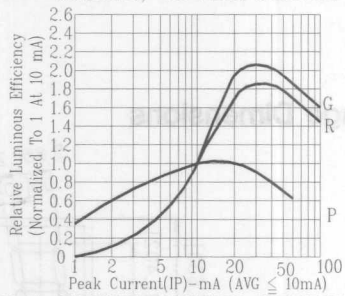


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

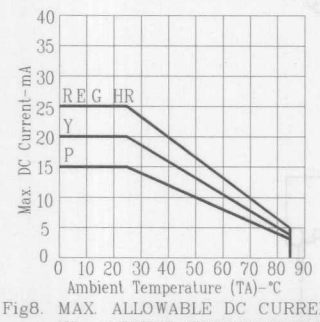


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

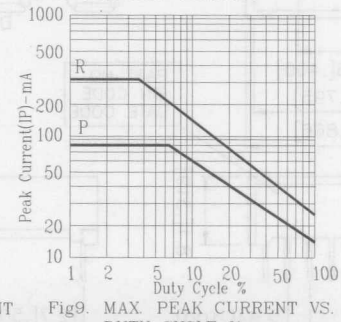


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

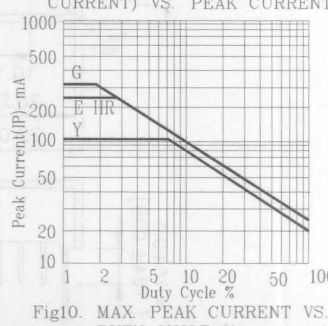


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE HR=HI.-EFF.RED (REFRESH RATE 1KHz)

SEVEN-SEGMENT LED DISPLAYS

0.4" Dual Digit Numeric LED Displays

LTD-432/482 Series

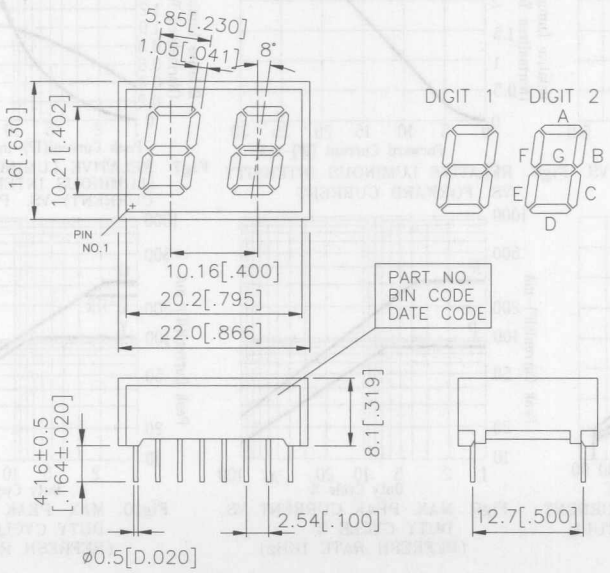
Features

- 0.4 inch (10.21mm) digit height.
- Continuous uniform segments.
- Choices of four bright colors-red/bright red/green/orange.
- Low power requirement.
- Excellent characters appearance.
- High contrast.
- High brightness.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. compatible.
- Easy mounting on P.C. board.

Description

The LTD-432XC/482XC series are 0.4 inch (10.21mm) height Dual digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from Gap on a transparent GaP substrate. The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red,bright red and orange displays have red cap. Green displays have green cap.

Package Dimensions



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

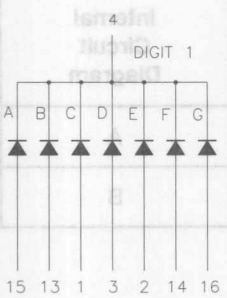
Part No.LTD-				Description	Internal Circuit Diagram
Red	Bright Red	Green	Orange		
432RC	432PC	432GC	432EC	Common Cathode	A
482RC	482PC	482GC	482EC	Common Anode	B

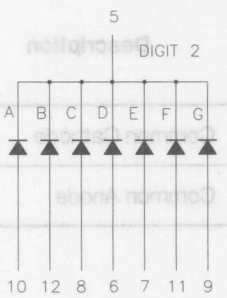
Pin Connection

Pin No.	Connection	
	A.LTD-432XC	B.LTD-482XC
1.	Anode C (Digit 1)	Cathode C (Digit 1)
2.	Anode E (Digit 1)	Cathode E (Digit 1)
3.	Anode D (Digit 1)	Cathode D (Digit 1)
4.	Common Cathode (Digit 1)	Common Anode (Digit 1)
5.	Common Cathode (Digit 2)	Common Anode (Digit 2)
6.	Anode D (Digit 2)	Cathode D (Digit 2)
7.	Anode E (Digit 2)	Cathode E (Digit 2)
8.	Anode C (Digit 2)	Cathode C (Digit 2)
9.	Anode G (Digit 2)	Cathode G (Digit 2)
10.	Anode A (Digit 2)	Cathode A (Digit 2)
11.	Anode F (Digit 2)	Cathode F (Digit 2)
12.	Anode B (Digit 2)	Cathode B (Digit 2)
13.	Anode B (Digit 1)	Cathode B (Digit 1)
14.	Anode F (Digit 1)	Cathode F (Digit 1)
15.	Anode A (Digit 1)	Cathode A (Digit 1)
16.	Anode G (Digit 1)	Cathode G (Digit 1)

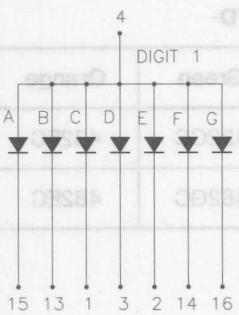
Internal Circuit Diagrams

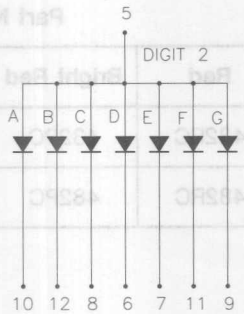
A.LTD-432XC





B.LTD-482XC





Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Orange	Unit
Power Dissipation Per Segment	55	40	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.20	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃				
Stroage Temperature Range	-35 ℃ to +85 ℃				
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃					

Electrical/Optical Characteristics at Ta=25 ℃

LTD-432RC/482RC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	79	300		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTD-432PC/482PC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTD-432GC/482GC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	500	1300		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTD-432EC/482EC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	500	1300		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

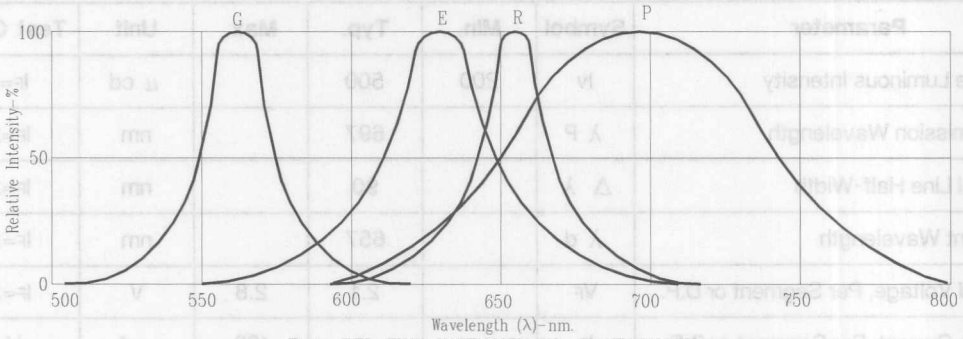


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

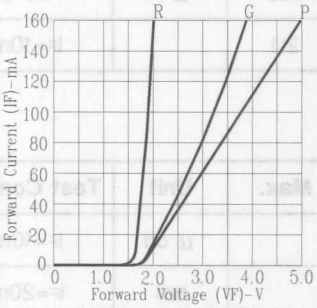


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

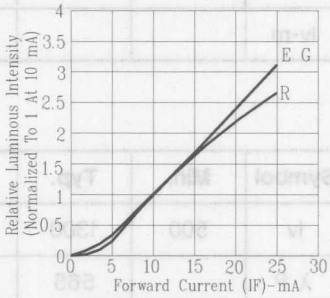


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

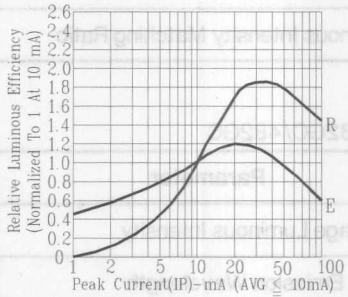


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

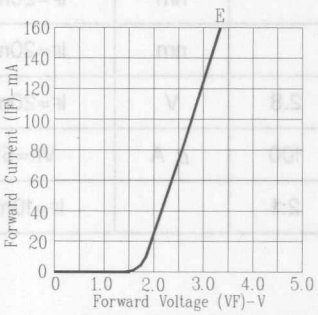


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

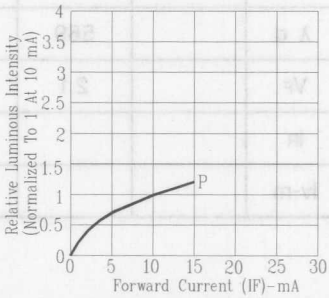


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

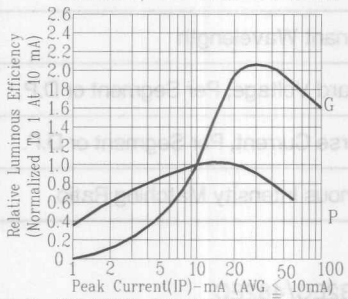


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

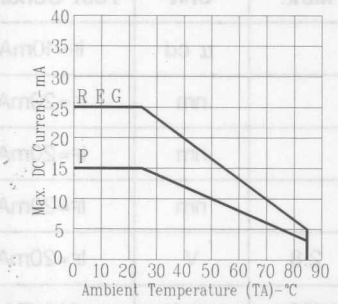


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

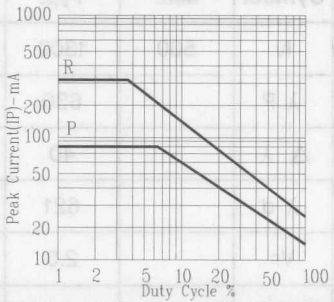


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

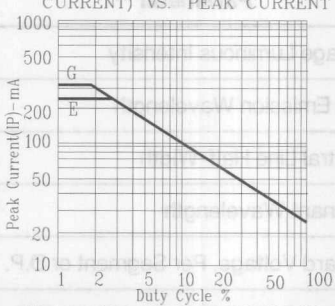


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN E ORANGE (REFRESH RATE 1KHz)

0.52" Seven-Segment Numeric LED Display

LTS-540A
LTD-5200 Series
LTC-5300/5800

Features

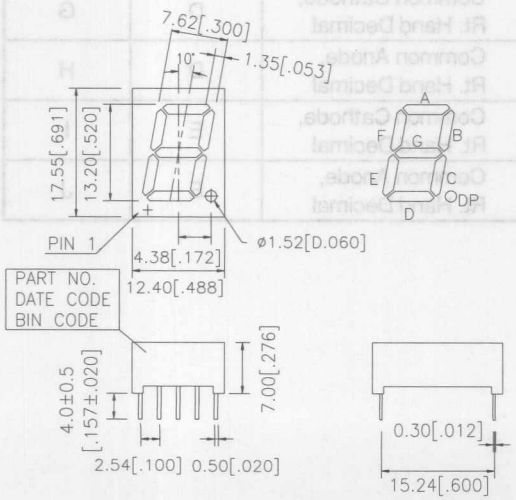
- 0.52 inch (13.2mm) digit height
- Continuous uniform segments.
- Choices of six bright colors-red/bright red/green/yellow/orange/high efficiency red.
- Low power requirement.
- Excellent characters appearance.
- High brightness.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

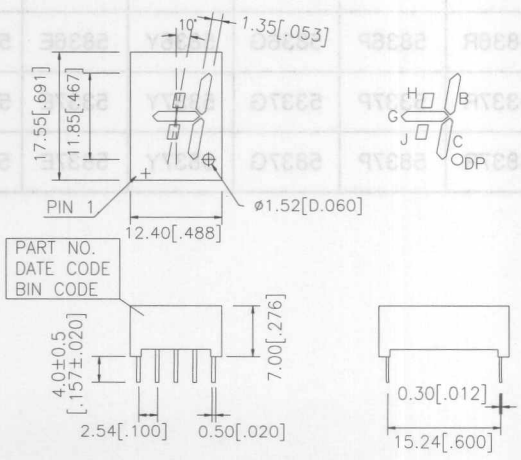
The LTS-540A, LTD-5000, LTC-5000 series are 0.52 inch (13.2mm) height 7-Segment displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from Gap on a transparent GaP substrate. The yellow orange and high efficiency red series devices are utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red,bright red,yellow and orange displays have gray face and white segments. Green displays have gray face and green segments. High efficiency red displays have red face and red segments.

Package Dimensions

A.LTS-546A/547A



B.LTS-548A/549A



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

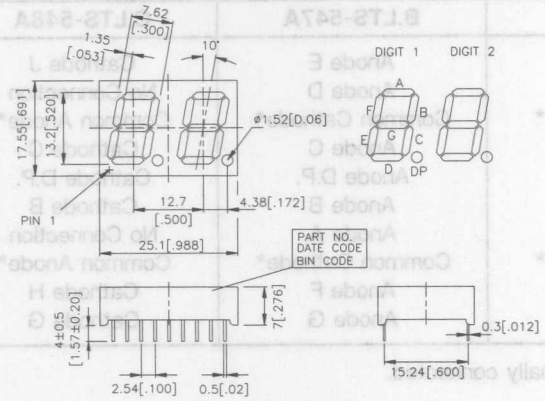
Devices

Part No.LTS-						Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange	Hi.-Eff.Red			
546AR	546AP	546AG	546AY	546AE	546AHR	Common Anode, Rt. Hand Decimal	A	A
547AR	547AP	547AG	547AY	547AE	547AHR	Common Cathode, Rt. Hand Decimal	A	B
548AR	548AP	548AG	548AY	548AE	548AHR	Common Anode, Rt. Hand Decimal	B	C
549AR	549AP	549AG	549AY	549AE	549AHR	Common Cathode, Rt. Hand Decimal	B	D

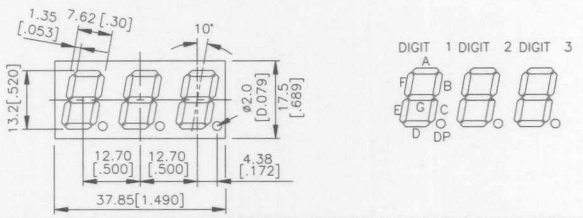
Part No.LTD-						Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange	Hi.-Eff.Red			
5250R	5250P	5250G	5250Y	5250E	5250HR	Common Anode, Rt. Hand Decimal	C	E
5260R	5260P	5260G	5260Y	5260E	5260HR	Common Cathode, Rt. Hand Decimal	C	F

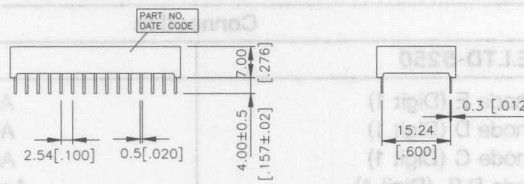
Part No.LTC-						Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange	Hi.-Eff.Red			
5336R	5336P	5336G	5336Y	5336E	5336HR	Common Cathode, Rt. Hand Decimal	D	G
5836R	5836P	5836G	5836Y	5836E	5836HR	Common Anode, Rt. Hand Decimal	D	H
5337R	5337P	5337G	5337Y	5337E	5337HR	Common Cathode, Rt. Hand Decimal	E	I
5837R	5837P	5837G	5837Y	5837E	5837HR	Common Anode, Rt. Hand Decimal	E	J

C.LTD-5250/5260

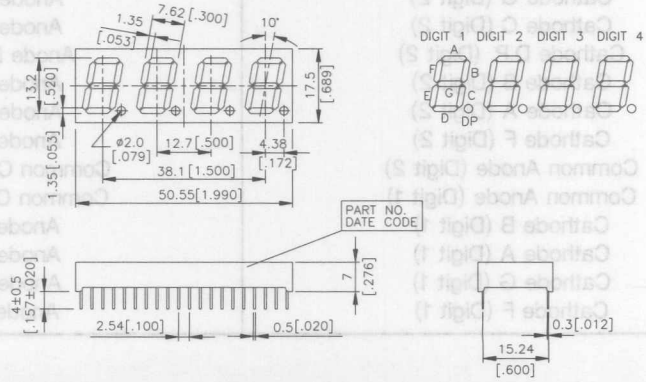


D.LTC-5336/5836





E.LTC-5337/5837



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Pin Connection

Pin No.	Connection			
	A.LTS-546A	B.LTS-547A	C.LTS-548A	D.LTS-549A
1.	Cathode E	Anode E	Cathode J	Anode J
2.	Cathode D	Anode D	No Connection	No Connection
3.	Common Anode*	Common Cathode*	Common Anode*	Common Cathode*
4.	Cathode C	Anode C	Cathode C	Anode C
5.	Cathode D.P.	Anode D.P.	Cathode D.P.	Anode D.P.
6.	Cathode B	Anode B	Cathode B	Anode B
7.	Cathode A	Anode A	No Connection	No Connection
8.	Common Anode*	Common Cathode*	Common Anode*	Common Cathode*
9.	Cathode F	Anode F	Cathode H	Anode H
10.	Cathode G	Anode G	Cathode G	Anode G

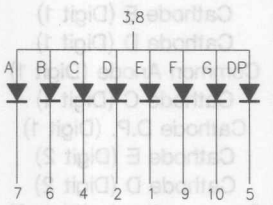
Notes: 1. Pin 3 & 8 are internally connected.

Pin No.	Connection	
	E.LTD-5250	F.LTD-5260
1.	Cathode E (Digit 1)	Anode E (Digit 1)
2.	Cathode D (Digit 1)	Anode D (Digit 1)
3.	Cathode C (Digit 1)	Anode C (Digit 1)
4.	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)
5.	Cathode E (Digit 2)	Anode E (Digit 2)
6.	Cathode D (Digit 2)	Anode D (Digit 2)
7.	Cathode G (Digit 2)	Anode G (Digit 2)
8.	Cathode C (Digit 2)	Anode C (Digit 2)
9.	Cathode D.P. (Digit 2)	Anode D.P. (Digit 2)
10.	Cathode B (Digit 2)	Anode B (Digit 2)
11.	Cathode A (Digit 2)	Anode A (Digit 2)
12.	Cathode F (Digit 2)	Anode F (Digit 2)
13.	Common Anode (Digit 2)	Common Cathode (Digit 2)
14.	Common Anode (Digit 1)	Common Cathode (Digit 1)
15.	Cathode B (Digit 1)	Anode B (Digit 1)
16.	Cathode A (Digit 1)	Anode A (Digit 1)
17.	Cathode G (Digit 1)	Anode G (Digit 1)
18.	Cathode F (Digit 1)	Anode F (Digit 1)

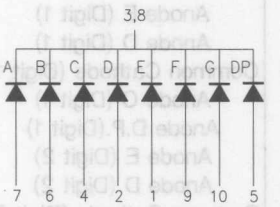
Pin No.	Connetcion			
	G.LTC-5336	H.LTC-5836	I.LTC-5337	J.LTC-5837
1.	Anode E (Digit 1)	Cathode E (Digit 1)	Anode E (Digit 1)	Cathode E (Digit 1)
2.	Anode D (Digit 1)	Cathode D (Digit 1)	Anode D (Digit 1)	Cathode D (Digit 1)
3.	Common Cathode (Digit 1)	Common Anode (Digit 1)	Common Cathode (Digit 1)	Common Anode (Digit 1)
4.	Anode C (Digit 1)	Cathode C (Digit 1)	Anode C (Digit 1)	Cathode C (Digit 1)
5.	Anode D.P.(Digit 1)	Cathode D.P. (Digit 1)	Anode D.P.(Digit 1)	Cathode D.P. (Digit 1)
6.	Anode E (Digit 2)	Cathode E (Digit 2)	Anode E (Digit 2)	Cathode E (Digit 2)
7.	Anode D (Digit 2)	Cathode D (Digit 2)	Anode D (Digit 2)	Cathode D (Digit 2)
8.	Common Cathode (Digit 2)	Common Anode (Digit 2)	Common Cathode (Digit 2)	Common Anode (Digit 2)
9.	Anode C (Digit 2)	Cathode C (Digit 2)	Anode C (Digit 2)	Cathode C (Digit 2)
10.	Anode D.P. (Digit 2)	Cathode D.P. (Digit 2)	Anode D.P. (Digit 2)	Cathode D.P. (Digit 2)
11.	Anode E (Digit 3)	Cathode E (Digit 3)	Anode E (Digit 3)	Cathode E (Digit 3)
12.	Anode D (Digit 3)	Cathode D (Digit 3)	Anode D (Digit 3)	Cathode D (Digit 3)
13.	Common Cathode (Digit 3)	Common Anode (Digit 3)	Common Cathode (Digit 3)	Common Anode (Digit 3)
14.	Anode C (Digit 3)	Cathode C (Digit 3)	Anode C (Digit 3)	Cathode C (Digit 3)
15.	Anode D.P. (Digit 3)	Cathode D.P. (Digit 3)	Anode D.P. (Digit 3)	Cathode D.P. (Digit 3)
16.	Anode B (Digit 3)	Cathode B (Digit 3)	Anode E (Digit 4)	Cathode E (Digit 4)
17.	Anode A (Digit 3)	Cathode A (Digit 3)	Anode D (Digit 4)	Cathode D (Digit 4)
18.	Common Cathode (Digit 3)	Common Anode (Digit 3)	Common Cathode (Digit 4)	Common Anode (Digit 4)
19.	Anode F (Digit 3)	Cathode F (Digit 3)	Anode C (Digit 4)	Cathode C (Digit 4)
20.	Anode G (Digit 3)	Cathode G (Digit 3)	Anode D.P.(Digit 4)	Cathode D.P. (Digit 4)
21.	Anode B (Digit 2)	Cathode B (Digit 2)	Anode B (Digit 4)	Cathode B (Digit 4)
22.	Anode A (Digit 2)	Cathode A (Digit 2)	Anode A (Digit 4)	Cathode A (Digit 4)
23.	Common Cathode (Digit 2)	Common Anode (Digit 2)	Common Cathode (Digit 4)	Common Anode (Digit 4)
24.	Anode F (Digit 2)	Cathode F (Digit 2)	Anode F (Digit 4)	Cathode F (Digit 4)
25.	Anode G (Digit 2)	Cathode G (Digit 2)	Anode G (Digit 4)	Cathode G (Digit 4)
26.	Anode B (Digit 1)	Cathode B (Digit 1)	Anode B (Digit 3)	Cathode B (Digit 3)
27.	Anode A (Digit 1)	Cathode A (Digit 1)	Anode A (Digit 3)	Cathode A (Digit 3)
28.	Common Cathode (Digit 1)	Common Anode (Digit 1)	Common Cathode (Digit 3)	Common Anode (Digit 3)
29.	Anode F (Digit 1)	Cathode F (Digit 1)	Anode F (Digit 3)	Cathode F (Digit 3)
30.	Anode G (Digit 1)	Cathode G (Digit 1)	Anode G (Digit 3)	Cathode G (Digit 3)
31.	-	-	Anode B (Digit 2)	Cathode B (Digit 2)
32.	-	-	Anode A (Digit 2)	Cathode A (Digit 2)
33.	-	-	Common Cathode (Digit 2)	Common Anode (Digit 2)
34.	-	-	Anode F (Digit 2)	Cathode F (Digit 2)
35.	-	-	Anode G (Digit 2)	Cathode G (Digit 2)
36.	-	-	Anode B (Digit 1)	Cathode B (Digit 1)
37.	-	-	Anode A (Digit 1)	Cathode A (Digit 1)
38.	-	-	Common Cathode (Digit 1)	Common Anode (Digit 1)
39.	-	-	Anode F (Digit 1)	Cathode F (Digit 1)
40.	-	-	Anode G (Digit 1)	Cathode G (Digit 1)

Internal Circuit Diagrams

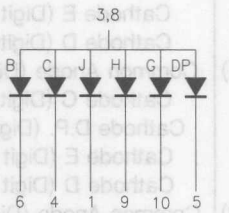
A.LTS-546A



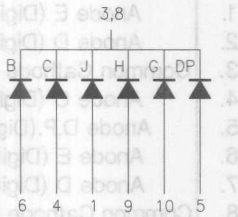
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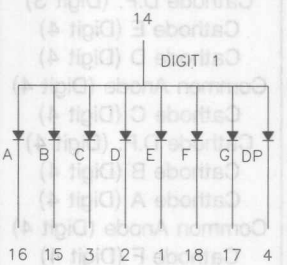
C.LTS-548A

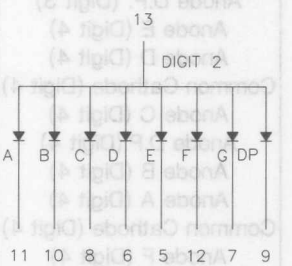


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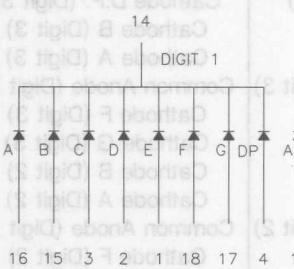


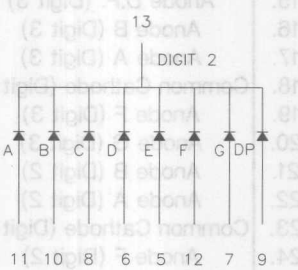
E.LTD-5250



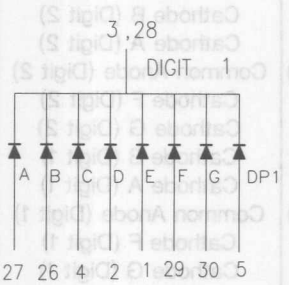


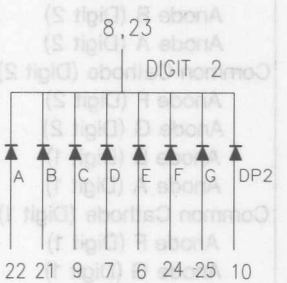
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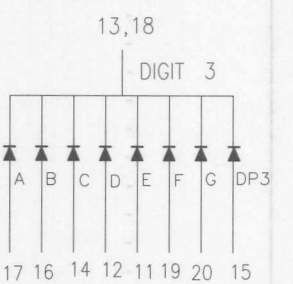




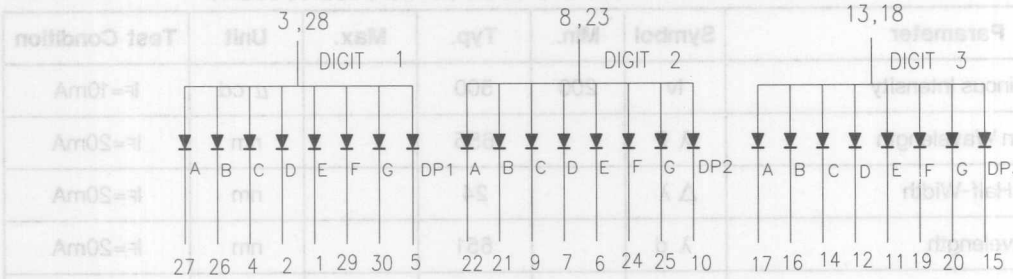
G.LTC-5336



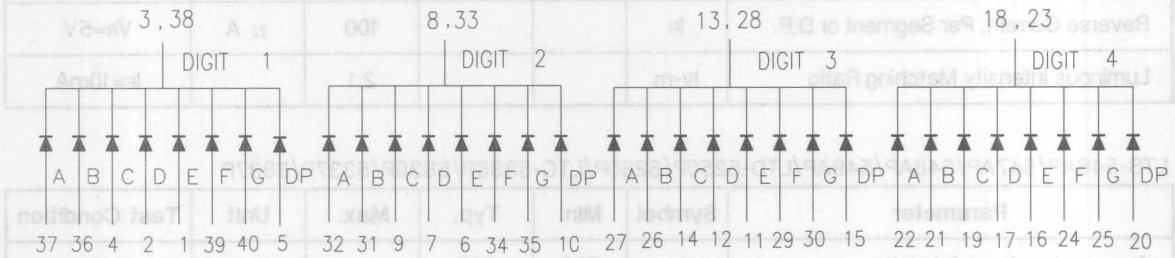




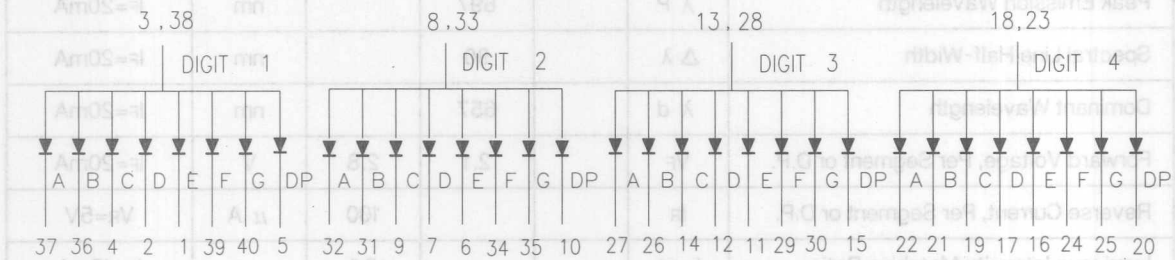
H.LTC-5836



I.LTC-5337



J.LTC-5837



Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Hi.-EFF. Red	Unit
Power Dissipation Per Segment	55	40	75	60	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.2	25 0.33	20 0.27	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃						
Stroage Temperature Range	-35 ℃ to +85 ℃						
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃							

Electrical/Optical Characteristics at Ta=25 ℃

LTS-546AR/547AR/548AR/549AR/LTD-5250R/5260R/LTC-5336R/5836R/5337R/5837R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-546AP/547AP/548AP/549AP/LTD-5250P/5260P/LTC-5336P/5836P/5337P/5837P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	800		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-546AG/547AG/548AG/549AG/LTD-5250G/5260G/LTC-5336G/5836G/5337G/5837G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		36		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-546AY/547AY/548AY/549AY/LTD-5250Y/5260Y/LTC-5336Y/5836Y/5337Y/5837Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-546AE/547AE/548AE/549AE/LTD-5250E/5260E/LTC-5336E/5836E/5337E/5837E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-546AHR/547AHR/548AHR/549AHR/LTD-5250HR/5260HR/LTC-5336HR/5836HR/5337HR/5837HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperature Unless Otherwise Noted)

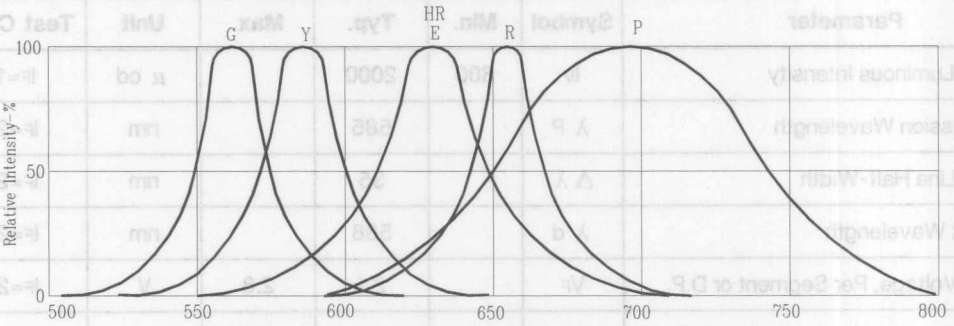


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

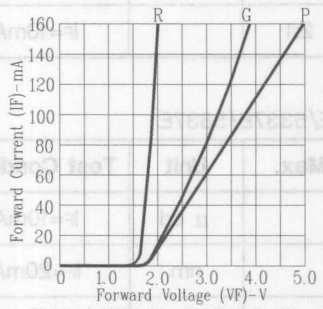


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

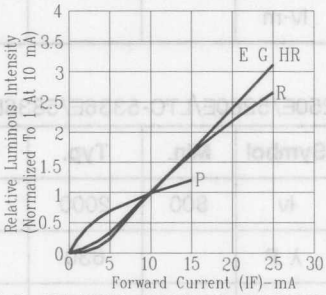


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

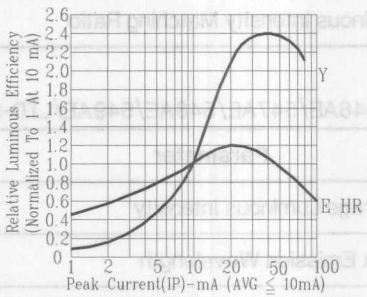


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

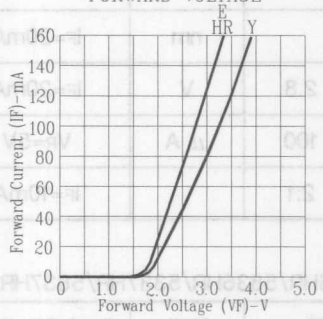


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

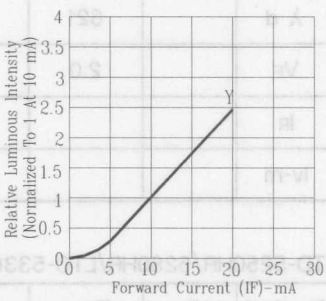


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

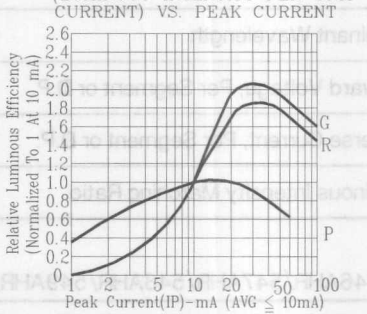


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

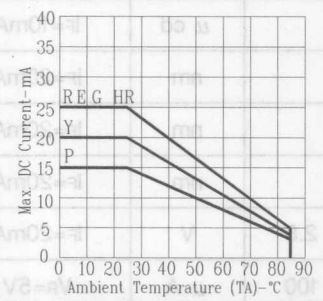


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

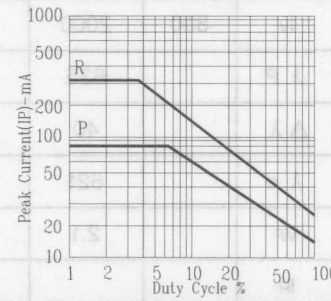


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

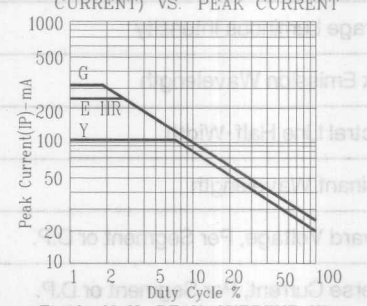


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE HR=HI.-EFF.RED (REFRESH RATE 1KHz)

LITEON

0.56" Seven-Segment Numeric LED Display

LTS-5x01A/5x03A
LTD-5x21A/5x23A Series
LTC-5653x-01/5753x-01

Features

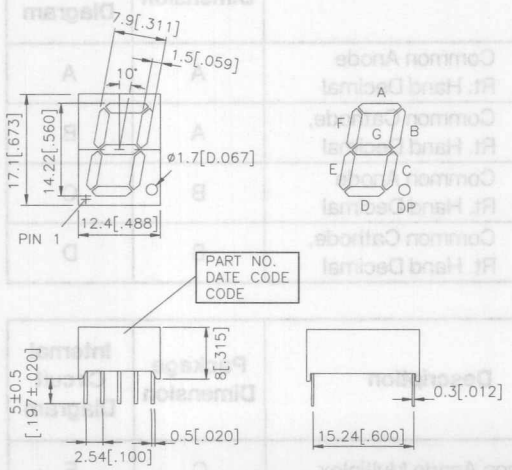
- 0.56 inch (14.22mm) digit height
- Continuous uniform segments.
- Low power requirement.
- Excellent characters appearance.
- High brightness & high contrast.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. compatible.
- Easy mounting on P.C. board or socket.

Description

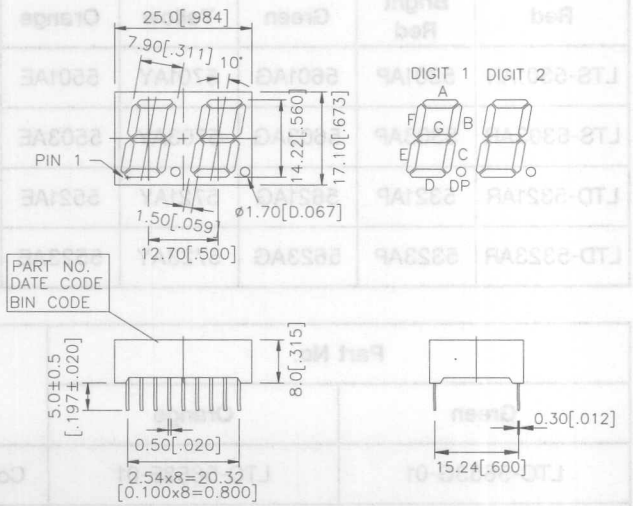
The LTS-5000A/LTD-5000A/LTC-5x53x-01 is a 0.56 inch (14.22mm) height 7-segment single, dual and quadruple displays.
The red series devices utilizes LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilizes LED chips which are made from GaP on a GaP substrate. The orange and yellow series devices utilizes LED chips which are made from GaAsP on a GaP substrate. The LTS-5000A/LTD-5000A red、bright red、yellow and orange displays have gray face and white segments, and Green displays have gray face and green segments. The LTC-5x53x-01 displays have gray face and white segments.

Package Dimensions

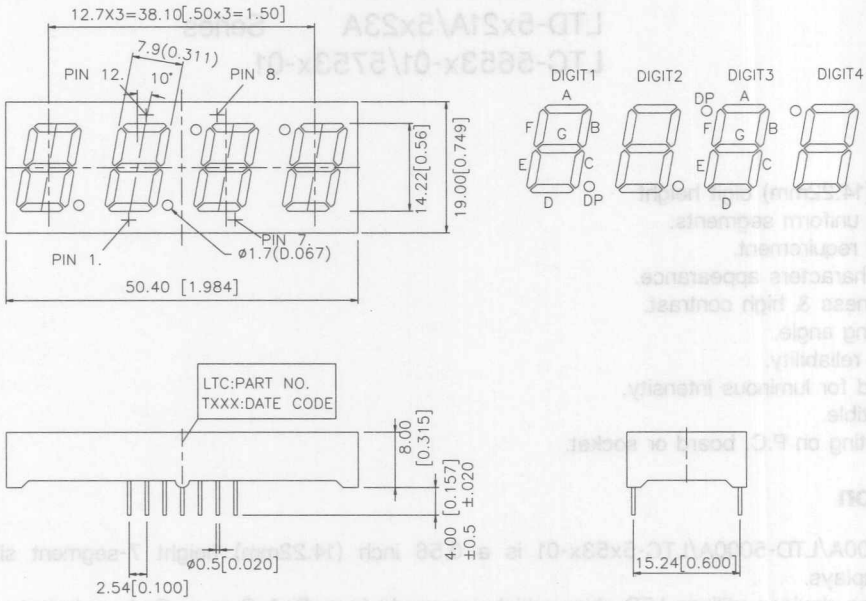
A.LTS-5X01A/5X03A



B.LTD-5X21A/5X23A



C.LTC-5653/5753



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No.					Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange			
LTS-5301AR	5301AP	5601AG	5701AY	5501AE	Common Anode Rt. Hand Decimal	A	A
LTS-5303AR	5303AP	5603AG	5703AY	5503AE	Common Cathode, Rt. Hand Decimal	A	B
LTD-5321AR	5321AP	5621AG	5721AY	5521AE	Common Anode Rt. Hand Decimal	B	C
LTD-5323AR	5323AP	5623AG	5723AY	5523AE	Common Cathode, Rt. Hand Decimal	B	D

Part No.		Description	Package Dimension	Internal Circuit Diagram
Green	Orange			
LTC-5653G-01	LTC-5653E-01	Common Anode Multiplex	C	E
LTC-5753G-01	LTC-5753E-01	Common Cathode Multiplex	C	F

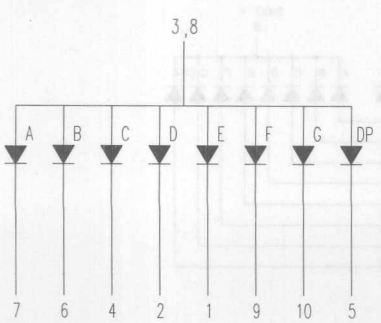
Pin Connection

Pin No.	Connection			
	A.LTS-5X01A	B.LTS-5X03A	C.LTD-5X21A	D.LTD-5X23A
1.	Cathode E	Anode E	Cathode E (Digit 1)	Anode E (Digit 1)
2.	Cathode D	Anode D	Cathode D (Digit 1)	Anode D (Digit 1)
3.	Common Anode *1	Common Cathode *1	Cathode C (Digit 1)	Anode C (Digit 1)
4.	Cathode C	Anode C	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)
5.	Cathode D.P.	Anode D.P.	Cathode E (Digit 2)	Anode E (Digit 2)
6.	Cathode B	Anode B	Cathode D (Digit 2)	Anode D (Digit 2)
7.	Cathode A	Anode A	Cathode G (Digit 2)	Anode G (Digit 2)
8.	Common Anode *1	Common Cathode *1	Cathode C (Digit 2)	Anode C (Digit 2)
9.	Cathode F	Anode F	Cathode D.P. (Digit 2)	Anode D.P. (Digit 2)
10.	Cathode G	Anode G	Cathode B (Digit 2)	Anode B (Digit 2)
11.	-	-	Cathode A (Digit 2)	Anode A (Digit 2)
12.	-	-	Cathode F (Digit 2)	Anode F (Digit 2)
13.	-	-	Cathode Anode (Digit 2)	Common Cathode (Digit 2)
14.	-	-	Cathode Anode (Digit 1)	Common Cathode (Digit 1)
15.	-	-	Cathode B (Digit 1)	Anode B (Digit 1)
16.	-	-	Cathode A (Digit 1)	Anode A (Digit 1)
17.	-	-	Cathode G (Digit 1)	Anode G (Digit 1)
18.	-	-	Cathode F (Digit 1)	Anode F (Digit 1)

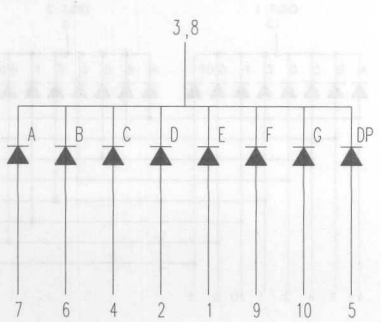
Pin No.	Connection	
	E.LTC-5653X-01	F.LTC-5753X-01
1.	Cathode E	Anode E
2.	Cathode D	Anode D
3.	Cathode D.P.	Anode D.P.
4.	Cathode C	Anode C
5.	Cathode G	Anode G
6.	Common Anode (Digit 4)	Common Cathode (Digit 4)
7.	Cathode B	Anode B
8.	Common Anode (Digit 3)	Common Cathode (Digit 3)
9.	Common Anode (Digit 2)	Common Cathode (Digit 2)
10.	Cathode F	Anode F
11.	Cathode A	Anode A
12.	Common Anode (Digit 1)	Common Cathode (Digit 1)

Internal Circuit Diagrams

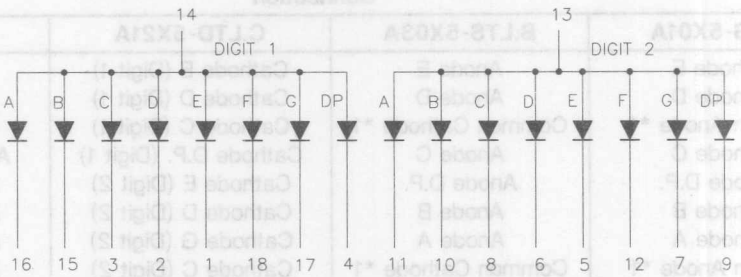
A.LTS-5X01A



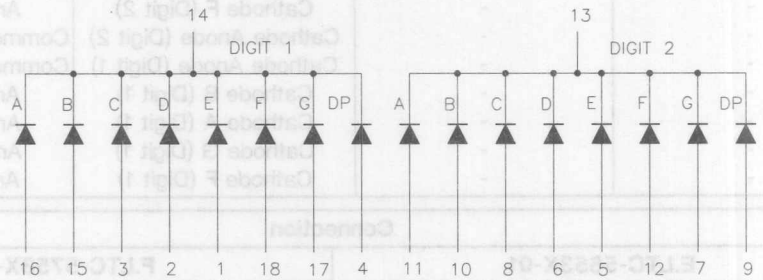
B.LTS-5X03A



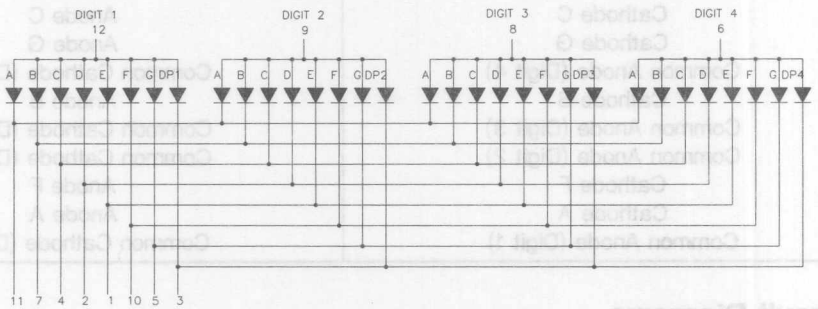
C.LTD-5X21A



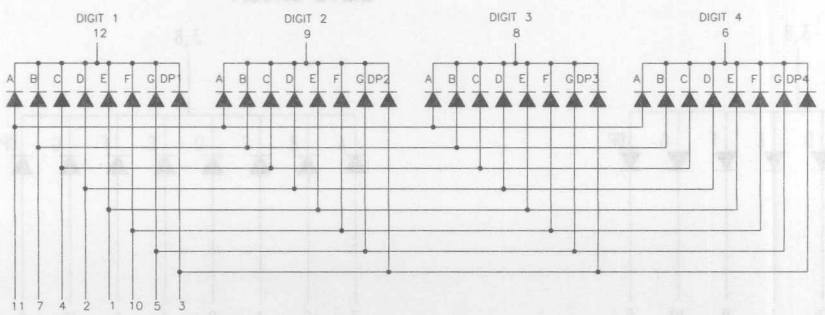
D.LTD-5X23A



E.LTC-5653X-01



F.LTC-5753X-01



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Unit
Power Dissipation Per Segment	55	40	75	60	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.20	25 0.33	20 0.27	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃					
Storage Temperature Range	-35 ℃ to +85 ℃					
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃						

Electrical/Optical Characteristics at Ta=25 ℃

LTS-5301AR/5303AR/LTD-5321AR/5323AR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	600		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-5301AP/5303AP/LTD-5321AP/5323AP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	950		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-5301AG/5303AG/LTD-5321AG/5323AG/LTC-5653G-01/5753G-01

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-5301AE/5303AE/LTD-5321AE/5323AE/LTC-5653E-01/5753E-01

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-5301AY/5303AY/LTD-5321AY/5323AY

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

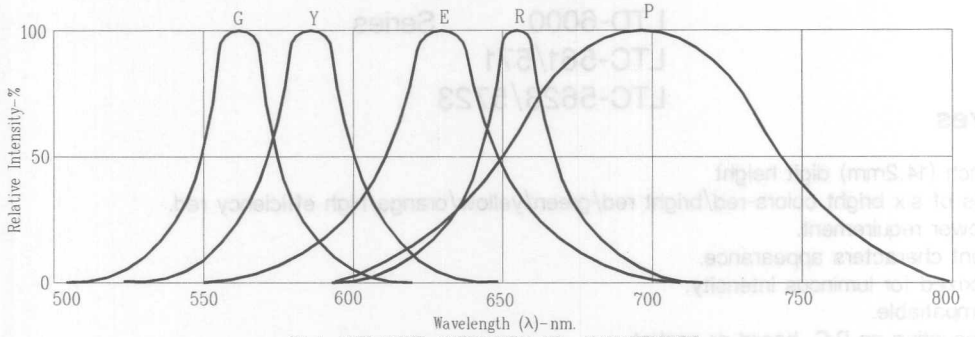


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

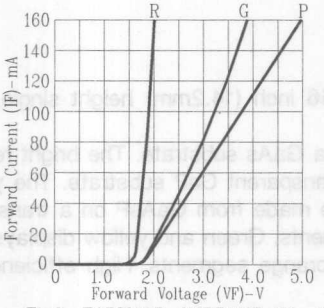


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

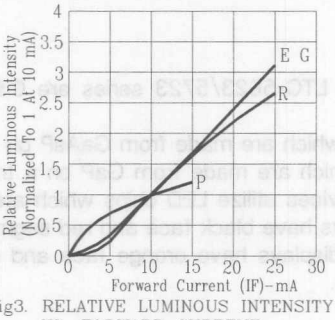


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

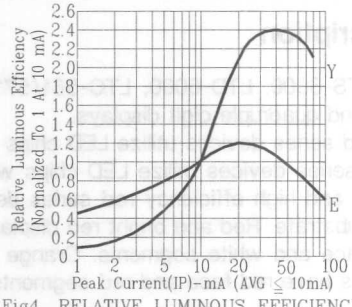


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

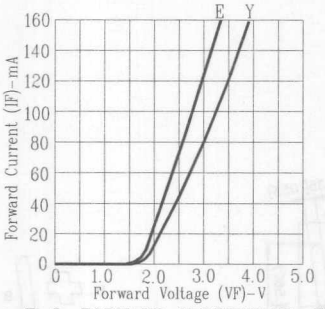


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

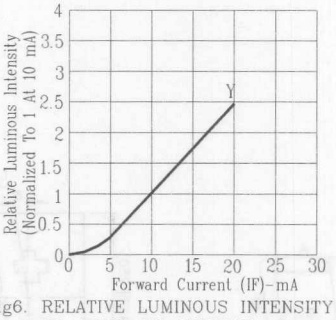


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

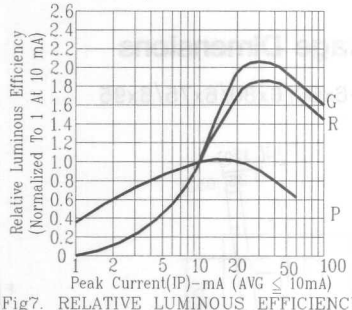


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

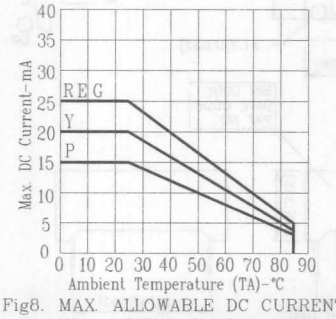


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

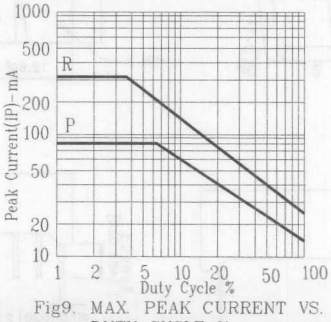


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

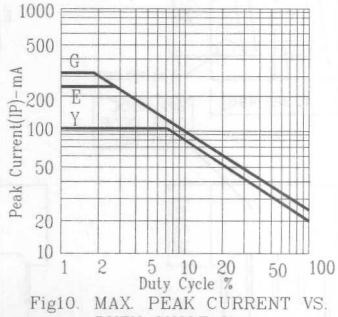


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE (REFRESH RATE 1KHz)

LITEON

0.56" Seven-Segment Numeric LED Displays

LTS-6000
LTD-6000 Series
LTC-561/571
LTC-5623/5723

Features

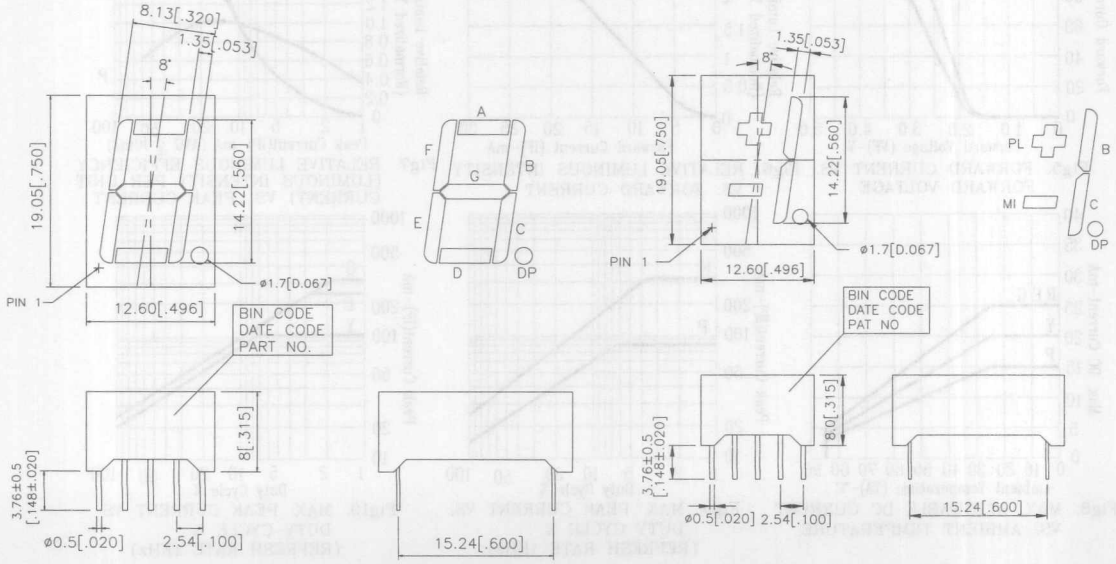
- 0.56 inch (14.2mm) digit height
- Choices of six bright colors-red/bright red/green/yellow/orange/high efficiency red.
- Low power requirement.
- Excellent characters appearance.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

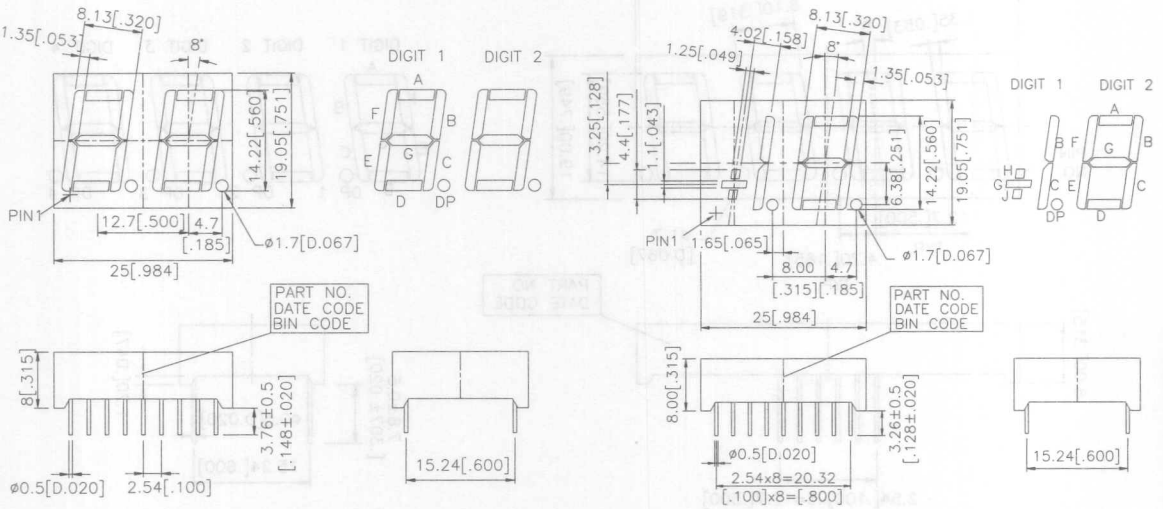
The LTS-6000, LTD-6000, LTC-561/571 LTC-5623/5723 series are 0.56 inch (14.2mm) height single, dual, triple and quadruple digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow, orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red and bright red displays have black face and red segments. Green and yellow displays have gray face and white segments. Orange displays have orange face and orange segments. High efficiency red displays have red face and red segments.

Package Dimensions

A.LTS-6x60/6x80/6x75/6x95

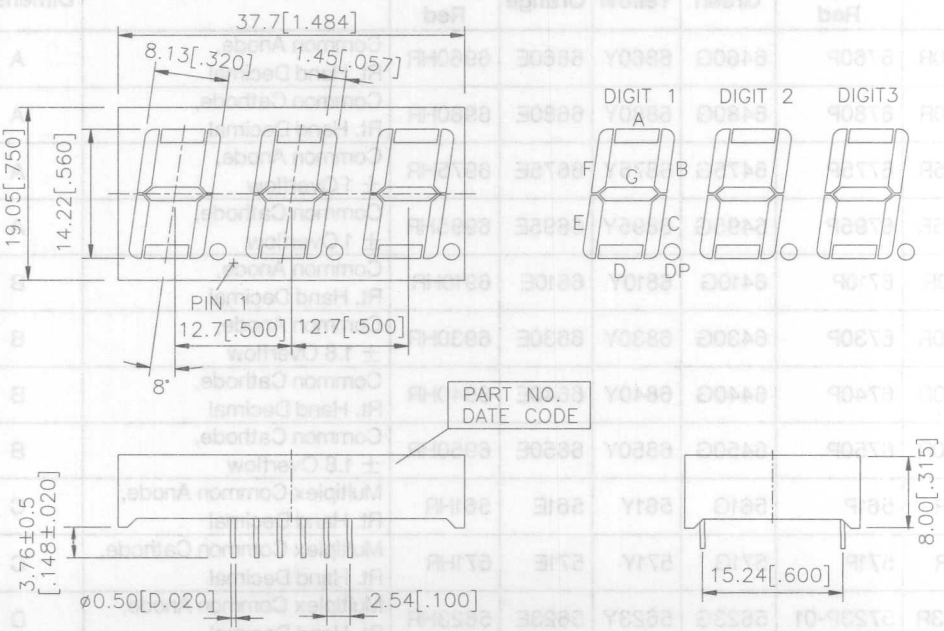


B.LTD-6x10/6x30/6x40/6x50



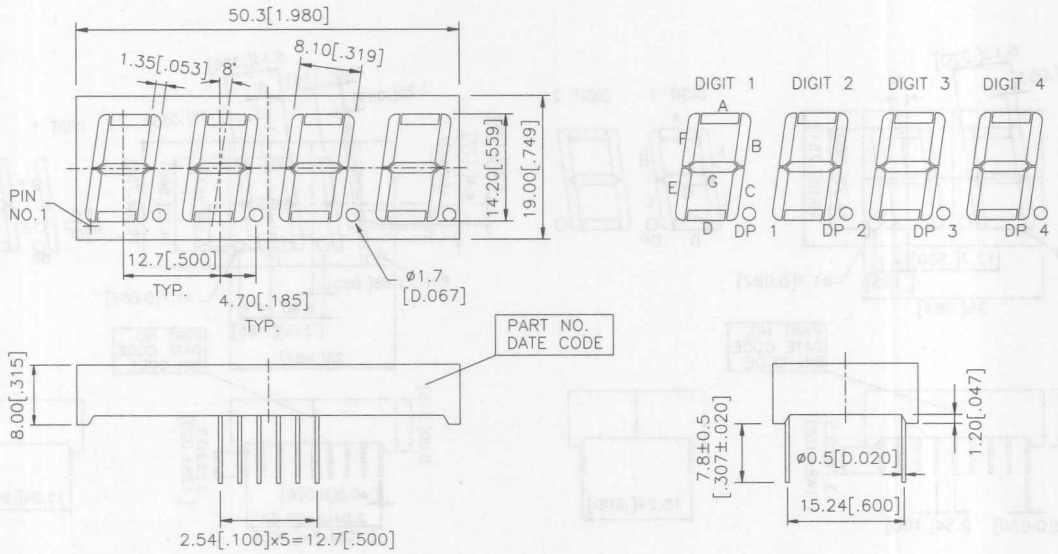
Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

C.LTC-561/571



SEVEN-SEGMENT LED DISPLAYS

D.LTC-5623/5723



Notes:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No.						Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange	Hi.-EFF Red			
LTS-6760R	6760P	6460G	6860Y	6660E	6960HR	Common Anode, Rt. Hand Decimal	A	A
LTS-6780R	6780P	6480G	6880Y	6680E	6980HR	Common Cathode, Rt. Hand Decimal	A	B
LTS-6775R	6775P	6475G	6875Y	6675E	6975HR	Common Anode, ± 1 Overflow	A	C
LTS-6795R	6795P	6495G	6895Y	6695E	6995HR	Common Cathode, ± 1 Overflow	A	D
LTD-6710R	6710P	6410G	6810Y	6610E	6910HR	Common Anode, Rt. Hand Decimal	B	E
LTD-6730R	6730P	6430G	6830Y	6630E	6930HR	Common Anode, ± 1.8 Overflow	B	F
LTD-6740R	6740P	6440G	6840Y	6640E	6940HR	Common Cathode, Rt. Hand Decimal	B	G
LTD-6750R	6750P	6450G	6850Y	6650E	6950HR	Common Cathode, ± 1.8 Overflow	B	H
LTC-561R	561P	561G	561Y	561E	561HR	Multiplex Common Anode, Rt. Hand Decimal	C	I
LTC-571R	571P	571G	571Y	571E	571HR	Multiplex Common Cathode, Rt. Hand Decimal	C	J
LTC-5623R	5723P-01	5623G	5623Y	5623E	5623HR	Multiplex Common Anode, Rt. Hand Decimal	D	K
LTC-5723R	5623P-01	5723G	5723Y	5723E	5723HR	Multiplex Common Cathode, Rt. Hand Decimal	D	L

Pin Connection

Pin No.	Connection			
	A.LTS-6x60	B.LTS-6x80	C.LTS-6x75	D.LTS-6x95
1.	Cathode E	Anode E	Cathode Minus Sign	Anode Minus Sign
2.	Cathode D	Anode D	Anode Pl.,Mi *2	Cathode Pl.,Mi *2
3.	Common Anode *1	Common Cathode *1	Cathode C	Anode C
4.	Cathode C	Anode C	Anode B.C.Dp *3	Cathode B.C.Dp *3
5.	Cathode D.P.	Anode D.P.	Cathode Dp	Anode Dp
6.	Cathode B	Anode B	Cathode B	Anode B
7.	Cathode A	Anode A	Anode B.C.Dp *3	Cathode B.C.Dp *3
8.	Common Anode *1	Common Cathode *1	Anode Pl.,Mi *2	Cathode Pl.,Mi *2
9.	Cathode F	Anode F	Cathode Plus Sign	Anode Plus Sign
10.	Cathode G	Anode G	No Connection	No Connection

Notes:1.Pin 3&8 are internally connected.
2.Pin 2&8 are internally connected.
3.Pin 4&7 are internally connected.

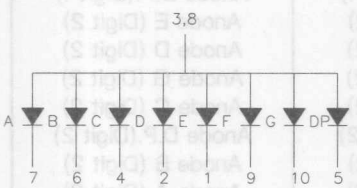
Pin No.	Connetcion			
	E.LTD-6x10	F.LTD-6x30	G.LTD-6x40	H.LTD-6x50
1.	Cathode E (Digit 1)	Cathode G (Digit 1)	Anode E (Digit 1)	Anode G (Digit 1)
2.	Cathode D (Digit 1)	Cathode J.H (Digit 1)	Anode D (Digit 1)	Anode J.H (Digit 1)
3.	Cathode C (Digit 1)	Cathode C (Digit 1)	Anode C (Digit 1)	Anode C (Digit 1)
4.	Cathode D.P. (Digit 1)	Cathode D.P. (Digit 1)	Anode D.P.(Digit 1)	Anode D.P.(Digit 1)
5.	Cathode E (Digit 2)	Cathode E (Digit 2)	Anode E (Digit 2)	Anode E (Digit 2)
6.	Cathode D (Digit 2)	Cathode D (Digit 2)	Anode D (Digit 2)	Anode D (Digit 2)
7.	Cathode G (Digit 2)	Cathode G (Digit 2)	Anode G (Digit 2)	Anode G (Digit 2)
8.	Cathode C (Digit 2)	Cathode C (Digit 2)	Anode C (Digit 2)	Anode C (Digit 2)
9.	Cathode D.P. (Digit 2)	Cathode D.P. (Digit 2)	Anode D.P.(Digit 2)	Anode D.P.(Digit 2)
10.	Cathode B (Digit 2)	Cathode B (Digit 2)	Anode B (Digit 2)	Anode B (Digit 2)
11.	Cathode A (Digit 2)	Cathode A (Digit 2)	Anode A (Digit 2)	Anode A (Digit 2)
12.	Cathode F (Digit 2)	Cathode F (Digit 2)	Anode F (Digit 2)	Anode F (Digit 2)
13.	Common Anode (Digit 2)	Common Anode (Digit 2)	Common Cathode (Digit 2)	Common Cathode (Digit 2)
14.	Common Anode (Digit 1)	Common Anode (Digit 1)	Common Cathode (Digit 1)	Common Cathode (Digit 1)
15.	Cathode B (Digit 1)	Cathode B (Digit 1)	Anode B (Digit 1)	Anode B (Digit 1)
16.	Cathode A (Digit 1)	No Connection	Anode A (Digit 1)	No Connection
17.	Cathode G (Digit 1)	No Connection	Anode G (Digit 1)	No Connection
18.	Cathode F (Digit 1)	No Connection	Anode F (Digit 1)	No Connection

Pin No.	Connetcion	
	I.LTC-561	J.LTC-571
1.	Cathode E	Anode E
2.	Cathode D	Anode D
3.	Cathode D.P.	Anode D.P.
4.	Cathode C	Anode C
5.	Cathode G	Anode G
6.	No Connection	No Connection
7.	Cathode B	Anode B
8.	Common Anode, Digit 3	Common Cathode, Digit 3
9.	Common Anode, Digit 2	Common Cathode, Digit 2
10.	Cathode F	Anode F
11.	Cathode A	Anode A
12.	Common Anode, Digit 1	Common Cathode, Digit 1

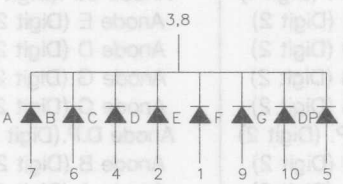
Pin No.	Connetcion	
	K.LTC-5623	L.LTC-5723
1.	Cathode E	Anode E
2.	Cathode D	Anode D
3.	Cathode D.P.	Anode D.P.
4.	Cathode C	Anode C
5.	Cathode G	Anode G
6.	Common Anode, Digit 4	Common Cathode Digit 4
7.	Cathode B	Anode B
8.	Common Anode, Digit 3	Common Cathode, Digit 3
9.	Common Anode, Digit 2	Common Cathode, Digit 2
10.	Cathode F	Anode F
11.	Cathode A	Anode A
12.	Common Anode, Digit 1	Common Cathode, Digit 1

Internal Circuit Diagrams

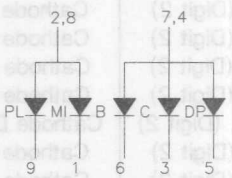
A.LTS-6x60



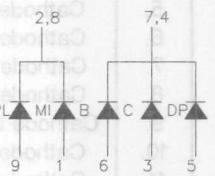
B.LTS-6x80



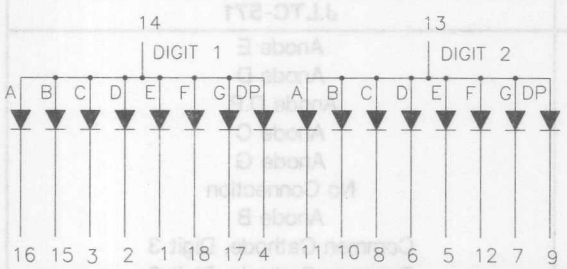
C.LTS-6x75



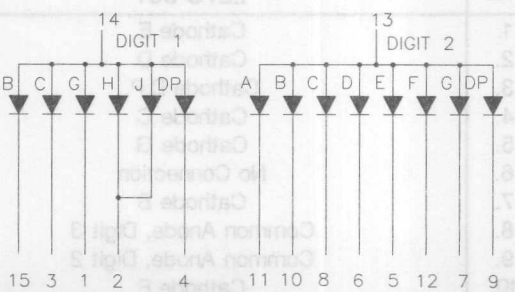
D.LTD-6x95



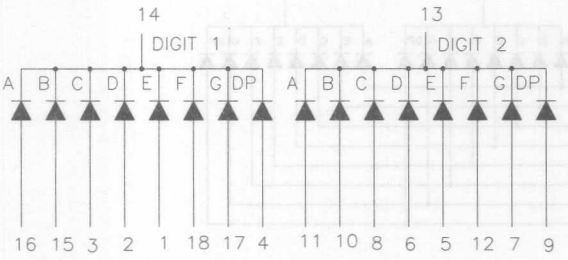
E.LTD-6x10



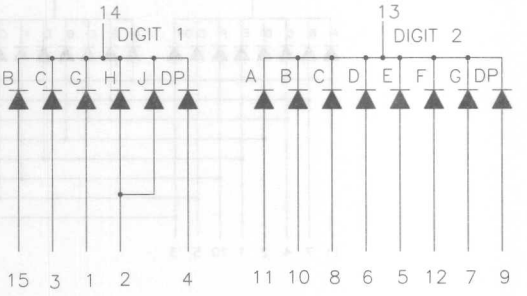
F.LTD-6x30



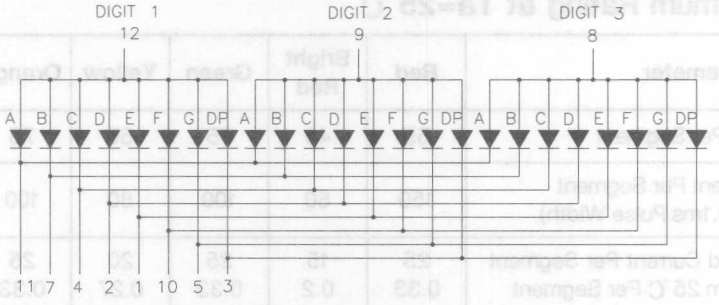
G.LTD-6x40



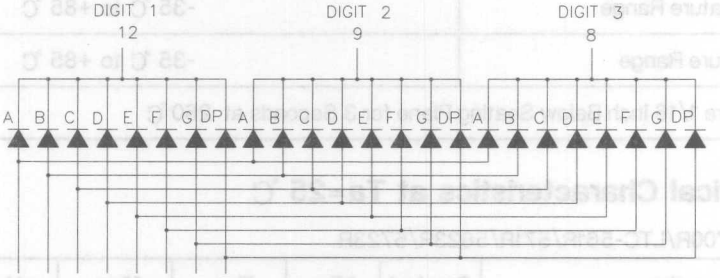
H.LTD-6x50



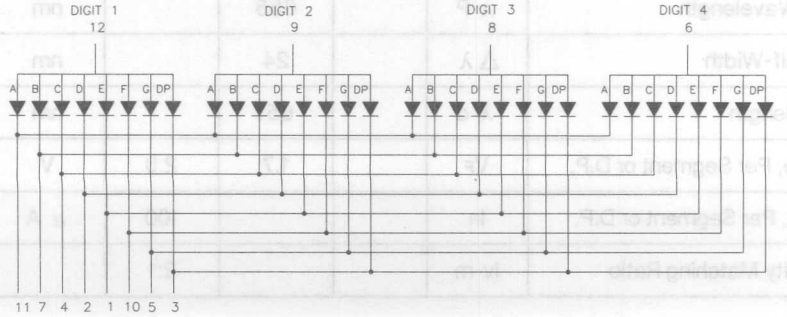
I.LTC-561



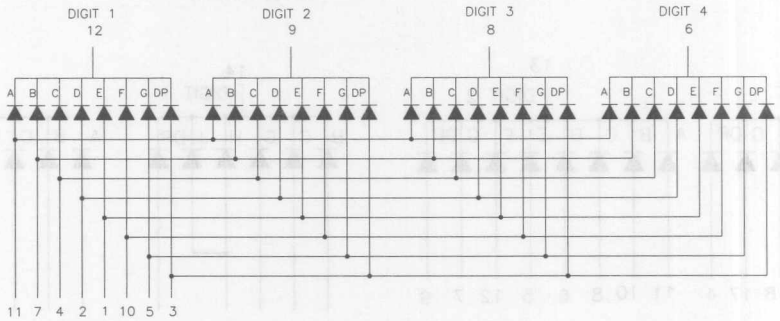
J.LTC-571



K.LTC-5623



L.LTC-5723



Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Hi.-EFF Red	Unit
Power Dissipation Per Segment	55	40	75	60	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.2	25 0.33	20 0.27	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Any Segment or D.P.	5	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃						
Storage Temperature Range	-35 ℃ to +85 ℃						
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃							

Electrical/Optical Characteristics at Ta=25 ℃

LTS-6700R/LTD-6700R/LTC-561R/571R/5623R/5723R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I_V	200	600		μ cd	I_F=10mA
Peak Emission Wavelength	λ P		655		nm	I_F=20mA
Spectral Line Half-Width	$\Delta\lambda$		24		nm	I_F=20mA
Dominant Wavelength	λ d		651		nm	I_F=20mA
Forward Voltage, Per Segment or D.P.	V_F		1.7	2.0	V	I_F=20mA
Reverse Current, Per Segment or D.P.	I_R			100	μ A	V_R=5V
Luminous Intensity Matching Ratio	I_V-m			2:1		I_F=10mA

LTS-6700P/LTD-6700P/LTC-561P/571P/5623P/5723P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	950		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-6400G/LTD-6400G/LTC-561G/571G/5623G/5723G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-6800Y/LTD-6800Y/LTC-561Y/571Y/5623Y/5723Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	Δ λ		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-6600E/LTD-6600E/LTC-561E/571E/5623E/5723E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-6900HR/LTD-6900HR/LTC-561HR/571HR/5623HR/5723HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical electrical/Optical Characteristic Curves (25 ℃ Ambient Temperatur Unless Otherwise Noted)

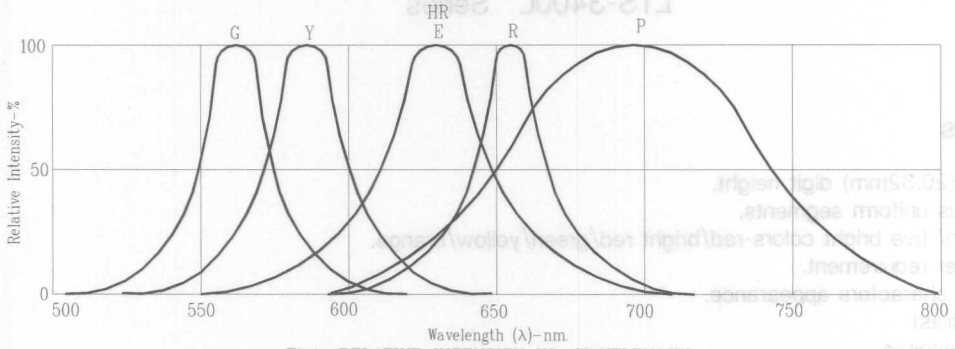


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

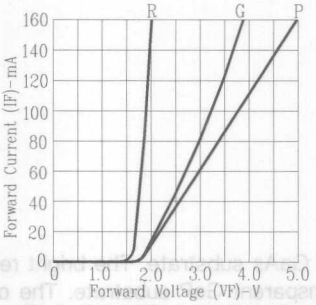


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

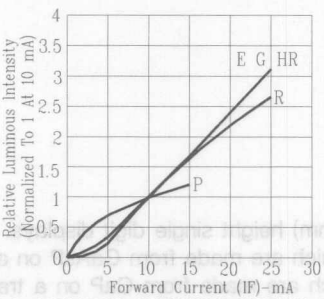


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

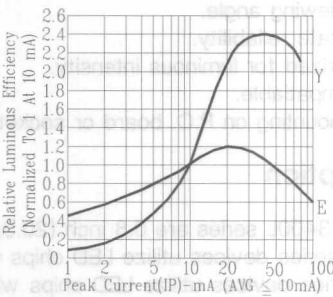


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

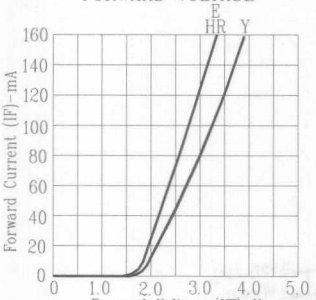


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

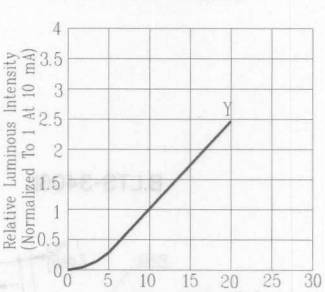


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

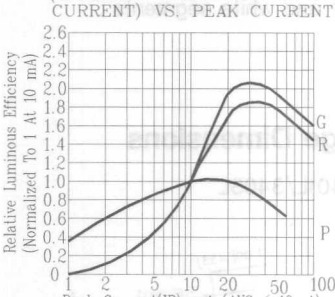


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

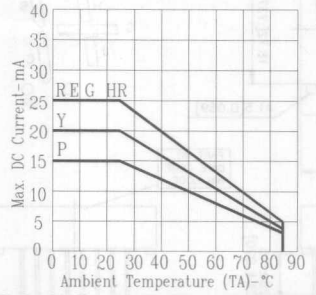


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

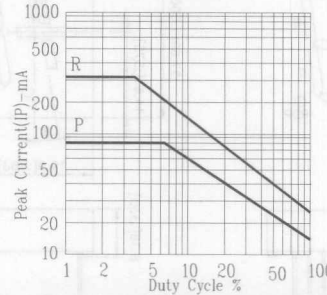


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

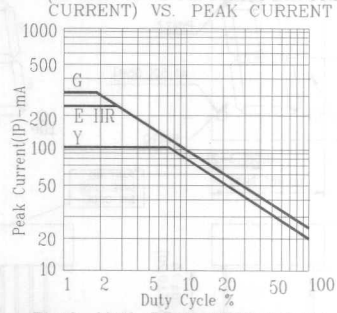


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE HR=HI.-EFF.RED (REFRESH RATE 1KHz)

SEVEN-SEGMENT LED DISPLAYS

LITEON

0.8" Single Digit Numeric LED Display

LTS-3400L Series

Features

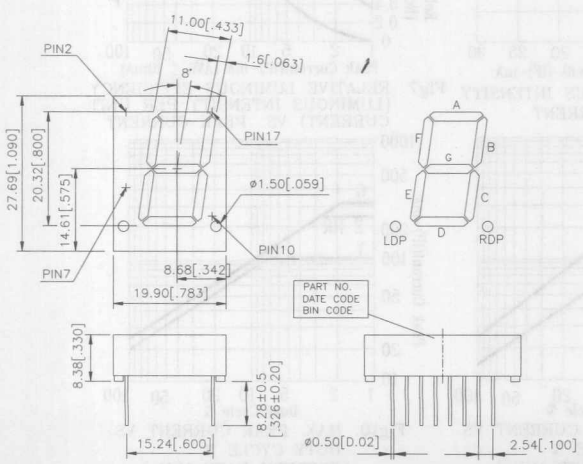
- 0.8 inch (20.32mm) digit height.
- Continuous uniform segments.
- Choices of five bright colors-red/bright red/green/yellow/orange.
- Low power requirement.
- Excellent characters appearance.
- High contrast.
- Hight brightness.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. compatiable.
- Easy mounting on P.C. board or socket.

Description

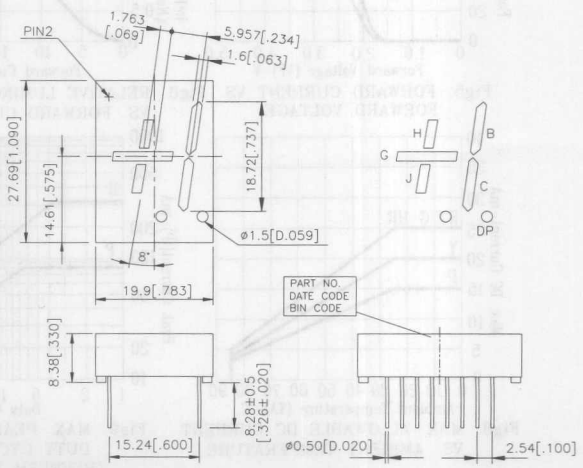
The LTS-3400L series are 0.8 inch (20.32mm) height single digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. All devices have gray face and white segments .

Package Dimensions

A.LTS-3401L/3403L



B.LTS-3406L



Note:All dimensions are in millimeters (inches). Tolerance: ± 0.25mm (0.01") unless otherwise noted.

Devices

Part No.LTS-					Description	Package Dimension	Internal Circuit Diagram
Red	Bright Red	Green	Yellow	Orange			
3401LR	3401LP	3401LG	3401LY	3401LE	Common Cathode, Rt. & Lt. Hand Decimal	A	A
3403LR	3403LP	3403LG	3403LY	3403LE	Common Cathode, Rt. & Lt. Hand Decimal	A	B
3406LR	3406LP	3406LG	3406LY	3406LE	Universal, ± 1 Overflow, Rt. & Lt. Hand Decimal	B	C

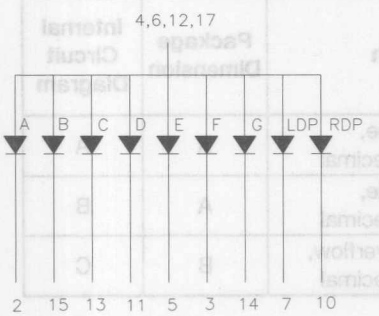
Pin Connection

Pin No.	Connection		
	A.LTS-3401L	B.LTS-3403L	B.LTS-3406L
1.	No Pin	No Pin	No Pin
2.	Cathode A	Anode A	Cathode B *2
3.	Cathode F	Anode F	Anode H
4.	Common Anode *1	Common Cathode *1	Cathode H
5.	Cathode E	Anode E	Cathode G
6.	Common Anode *1	Common Cathode *1	Cathode J
7.	Cathode L.D.P.	Anode L.D.P.	Anode J
8.	No Pin	No Pin	Cathode D.P. *3
9.	No Pin	No Pin	No Pin
10.	Cathode R.D.P.	Anode R.D.P.	Anode D.P.
11.	Cathode D	Anode D	Cathode D.P.*3
12.	Common Anode *1	Common Anode *1	Cathode C
13.	Cathode C	Cathode C	Anode C
14.	Cathode G	Cathode G	Anode G
15.	Cathode B	Cathode B	Anode B
16.	No pin	No pin	No pin
17.	Common Anode *1	Common Cathode *1	Cathode B *2
18.	No pin	No pin	No pin

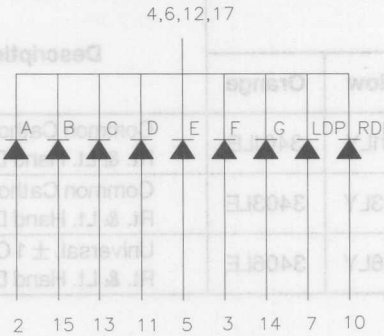
Notes:1.Pin 4.6、12&17 are internally connect.
2.Pin 2&17 are internally connected.
3.Pin 8&11 are internally connected.

Internal Circuit Diagrams

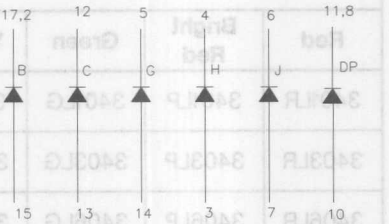
A.LTS-3401Lx



B.LTS-3403Lx



C.LTS-3406Lx



Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Yellow	Orange	Unit
Power Dissipation Per Segment	55	40	75	60	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	150	60	100	80	100	mA
Continuous Forward Current Per Segment Derating Linear from 25 ℃ Per Segment	25 0.33	15 0.2	25 0.33	20 0.27	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃					
Storage Temperature Range	-35 ℃ to +85 ℃					
Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260 ℃						

Electrical/Optical Characteristics at Ta=25 ℃

LTS-3400LR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	600		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-3400LP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	950		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		657		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-3400LG

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-3400LY

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		585		nm	IF=20mA
Spectral Line Half-Width	$\Delta\lambda$		35		nm	IF=20mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTS-3400LE

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	$\Delta\lambda$		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves
(25 ℃ Ambient Temperatur Unless Otherwise Noted)

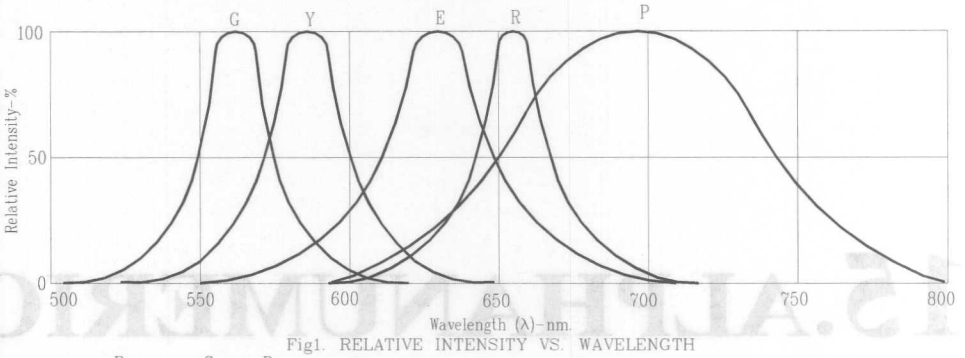


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

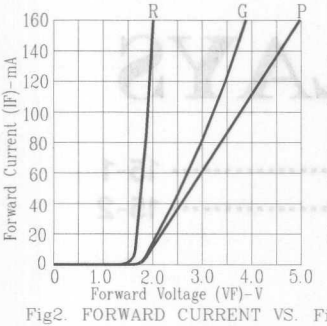


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

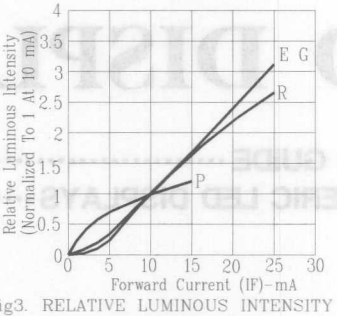


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

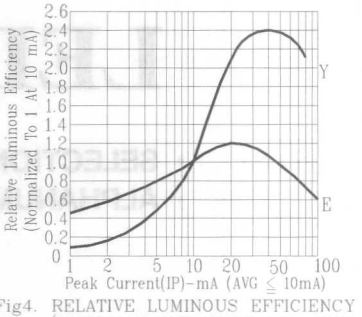


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

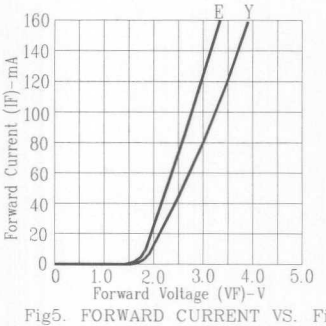


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

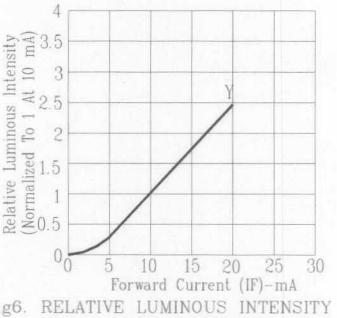


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

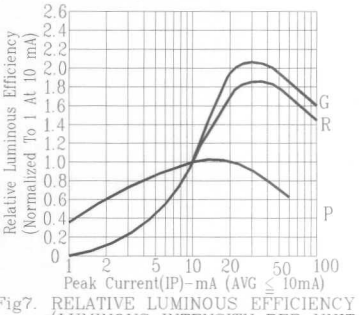


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

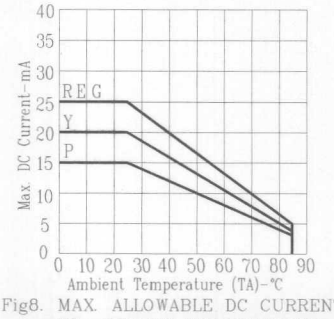


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

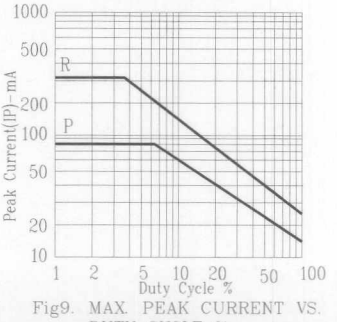


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

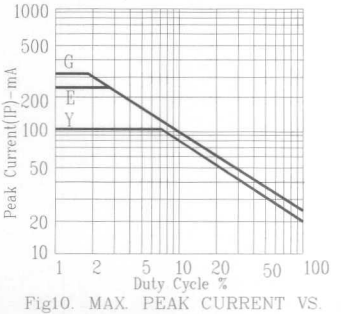


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

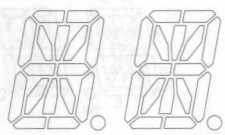
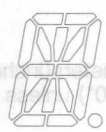
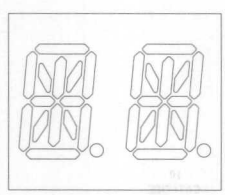
NOTE: R=RED P=BRIGHT RED G=GREEN Y=YELLOW E=ORANGE (REFRESH RATE 1KHz)

15. ALPHANUMERIC LED DISPLAYS

- SELECTION GUIDE 15-1
- ALPHANUMERIC LED DISPLAYS 15-2

Selection Guide

· Alphanumeric LED Displays

Package	Part No.	Color(λ P)	Description	Typ. Iv/SEG. @IF=10mA	Page No.
 10.0mm(.4") Dual-In-Line .63"H × .8"W × .28"D	LTP-4323G LTP-4323E	Green (565nm) Orange (630nm)	Common Cathode, Multiplex, Dual Character. Rt. Hand Decimal	2000 μ cd 2000 μ cd	15-2
	LTP-4823G LTP-4823E	Green (565nm) Orange (630nm)	Common Anode, Multiplex, Dual Character. Rt. Hand Decimal	2000 μ cd 2000 μ cd	
 12.7mm(.5") Dual-In-Line 1"H × .63"W × .38"D	LTP-537R LTP-537P LTP-537G LTP-537E LTP-537HR	Red (655nm) Bright Red (697nm) Green (565nm) Orange (630nm) Hi.-Eff. Red (635nm)	Common Cathode, Single Character. Rt. Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	15-6
	LTP-587R LTP-587P LTP-587G LTP-587E LTP-587HR	Red (655nm) Bright Red (697nm) Green (565nm) Orange (630nm) Hi.-Eff. Red (635nm)	Common Anode, Single Character. Rt. Hand Decimal	500 μ cd 750 μ cd 2000 μ cd 2000 μ cd 2000 μ cd	
 13.8mm(.54") Dual-In-Line .84"H × 1"W × .32"D	LTP-3784R LTP-3784G LTP-3784E	Red (655nm) Green (565nm) Orange (630nm)	Common Cathode, Multiplex, Dual Character. Rt. Hand Decimal	400 μ cd 1800 μ cd 1800 μ cd	15-11
	LTP-3786R LTP-3786G LTP-3786E	Red (655nm) Green (565nm) Orange (630nm)	Common Anode, Multiplex, Dual Character. Rt. Hand Decimal	400 μ cd 1800 μ cd 1800 μ cd	

0.4"Alphanumeric LED Displays

LTP-4323/4823 Series

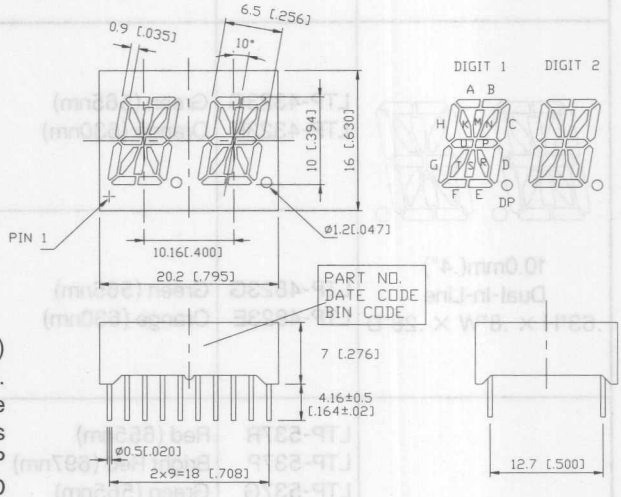
Features

- 0.4 inch (10.0mm) digit height.
- Continuous uniform Segments.
- Low power requirements.
- Excellent characters and appearance.
- Wide viewing angle.
- Solid state reliability.
- Common anode or common cathode models.
- Categorized for luminous intensity.
- Easy mounting on P.C. board.

Description

The LTP-4323/4823 series are 0.4 inch (10.0mm) height 16-segment dual digit alphanumeric displays. The dual digit displays have gray face and white segments. The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.

Package Dimensions



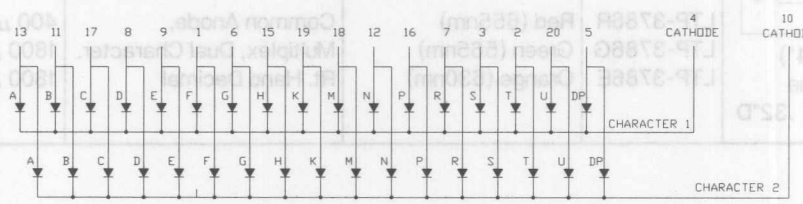
Notes: All dimensions are in millimeters(inches).
Tolerance: ± 0.25mm (0.010") unless otherwise noted.

Devices

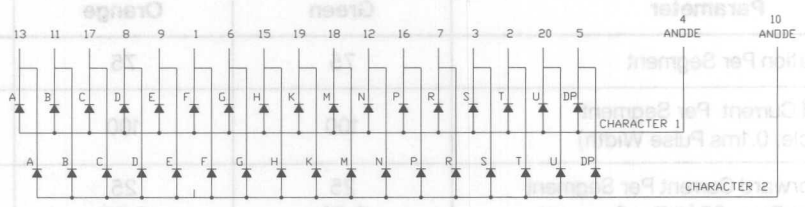
Part No.		Description	Internal Circuit Diagram
Green	Orange		
LTP-4323G	LTP-4323E	Multiplex Common Cathode, Rt. Hand Decimal	A
LTP-4823G	LTP-4823E	Multiplex Common Anode, Rt. Hand Decimal	B

Internal Circuit Diagrams

A. LTP-4323



B. LTP-4823



Pin Connection

Pin No.	Connection	
	A. LTP-4323	B. LTP-4823
1	Anode F	Cathode F
2	Anode T	Cathode T
3	Anode S	Cathode S
4	Common Cathode Character 1	Common Anode Character 1
5	Anode DP	Cathode DP
6	Anode G	Cathode G
7	Anode R	Cathode R
8	Anode D	Cathode D
9	Anode E	Cathode E
10	Common Cathode Character 2	Common Anode Character 2
11	Anode B	Cathode B
12	Anode N	Cathode N
13	Anode A	Cathode A
14	No Connection	No Connection
15	Anode H	Cathode H
16	Anode P	Cathode P
17	Anode C	Cathode C
18	Anode M	Cathode M
19	Anode K	Cathode K
20	Anode U	Cathode U

Absolute Maximum Rating at Ta=25 ℃

Parameter	Green	Orange	Unit
Power Dissipation Per Segment	75	75	mW
Peak Forward Current Per Segment ($^1/_{10}$ Duty Cycle, 0.1ms Pulse Width)	100	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃		
Storage Temperature Range	-35 ℃ to +85 ℃		
Solder Temperature $^1/_{16}$ Inch Below Seating Plane for 3 Seconds at 260 ℃			

Electrical / Optical Characteristics at Ta=25 ℃

LTP-4323G/4823G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Segment	Iv	800	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, Per Segment	VF		2.1	2.8	V	IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-4323E/4823E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity Per Segment	Iv	800	2200		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, Per Segment	VF		2.0	2.8	V	IF=20mA
Reverse Current, Per Segment	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

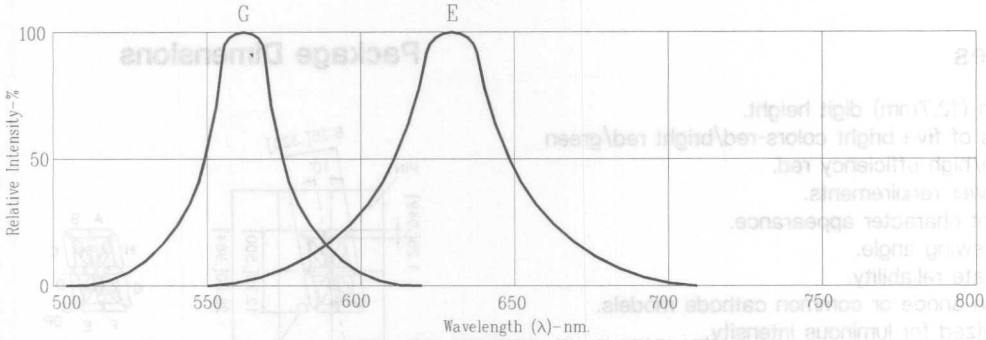


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

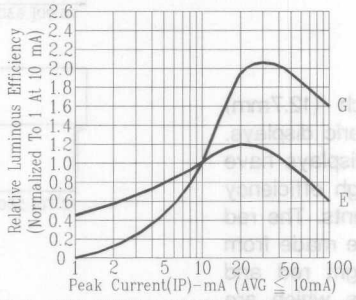


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

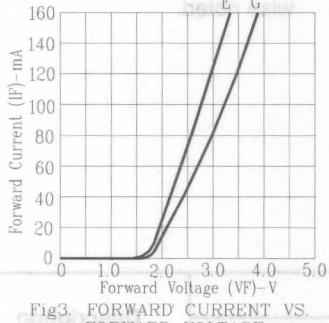


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

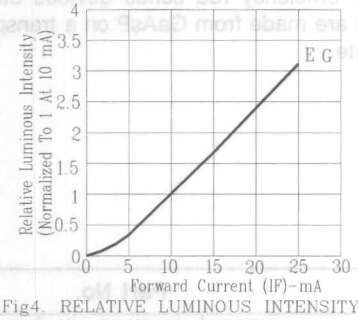


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

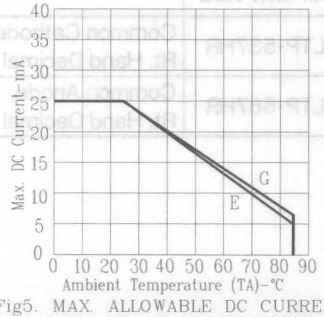


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

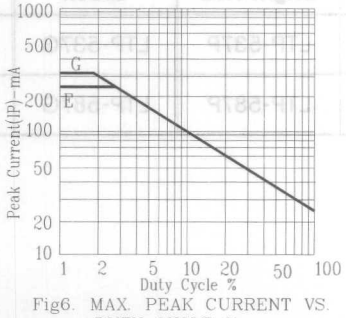


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: E=ORANGE G=GREEN (REFRESH RATE 1KHz)

LITEON

0.5"Alphanumeric LED Displays

LTP-537/587 Series

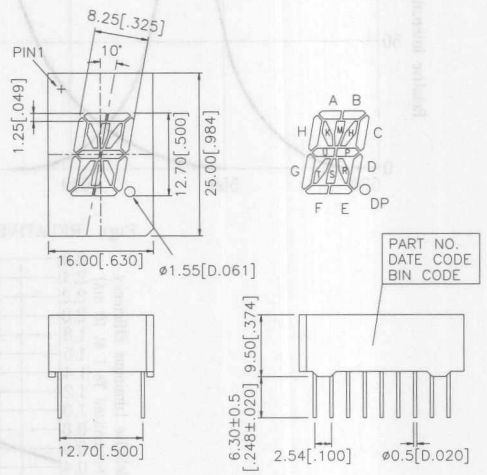
Features

- 0.5 inch (12.7mm) digit height.
- Choices of five bright colors-red/bright red/green /orange/high efficiency red.
- Low power requirements.
- Excellent character appearance.
- Wide viewing angle.
- Solid state reliability.
- Common anode or common cathode models.
- Categorized for luminous intensity.
- Easy mounting on P.C. board.

Description

The LTP-537/587 series are 0.5 inch (12.7mm) height 16-segment single digit alphanumeric displays. The red, bright red, green and orange displays have black face and white segments. The high efficiency red display has red face and red segments. The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.

Package Dimensions



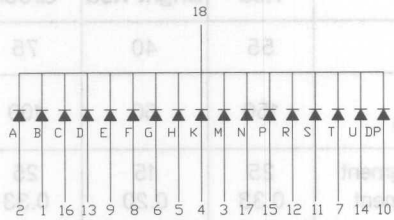
Notes: All dimensions are in millimeters (inches).
Tolerance: ± 0.25mm (0.010") unless otherwise noted.

Devices

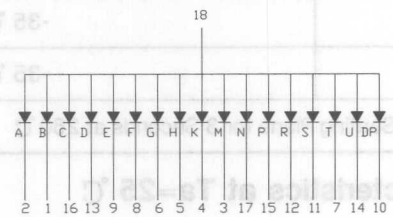
Part No.					Description	Internal Circuit Diagram
Red	Bright Red	Green	Orange	Hi.-Eff. Red		
LTP-537R	LTP-537P	LTP-537G	LTP-537E	LTP-537HR	Common Cathode, Rt. Hand Decimal	A
LTP-587R	LTP-587P	LTP-587G	LTP-587E	LTP-587HR	Common Anode, Rt. Hand Decimal	B

Internal Circuit Diagrams

A. LTP-537



B. LTP-587



Pin Connection

Pin No.	Connection	
	A. LTP-537	B. LTP-587
1	Anode B	Cathode B
2	Anode A	Cathode A
3	Anode M	Cathode M
4	Anode K	Cathode K
5	Anode H	Cathode H
6	Anode G	Cathode G
7	Anode T	Cathode T
8	Anode F	Cathode F
9	Anode E	Cathode E
10	Anode D.P.	Cathode D.P.
11	Anode S	Cathode S
12	Anode R	Cathode R
13	Anode D	Cathode D
14	Anode U	Cathode U
15	Anode P	Cathode P
16	Anode C	Cathode C
17	Anode N	Cathode N
18	Common Cathode	Common Anode

Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Bright Red	Green	Orange	Hi.-Eff.Red	Unit
Power Dissipation Per Segment	55	40	75	75	75	mW
Peak Forward Current Per Segment ($^1/_{10}$ Duty Cycle, 0.1ms Pulse Width)	150	60	100	100	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	25 0.33	15 0.20	25 0.33	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃					
Storage Temperature Range	-35 ℃ to +85 ℃					
Solder Temperature $^1/_{16}$ inch Below Seating Plane for 3 Seconds at 260 ℃						

Electrical / Optical Characteristics at Ta=25 ℃

LTP-537R/587R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	500		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectral Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-537P/587P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	750		μ cd	IF=10mA
Peak Emission Wavelength	λ P		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-537G/587G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-537E/587E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-537HR/587HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2000		μ cd	IF=10mA
Peak Emission Wavelength	λ P		635		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical / Optical Characteristic Curves
(25 ℃ Ambient Temperature Unless Otherwise Noted)



Fig1. RELATIVE INTENSITY VS. WAVELENGTH

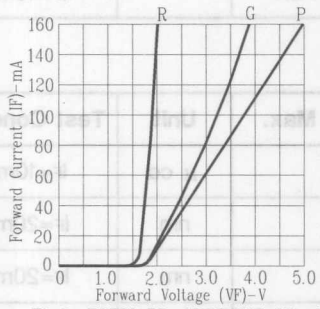


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

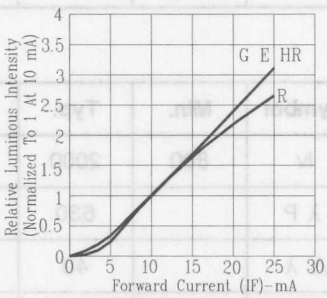


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

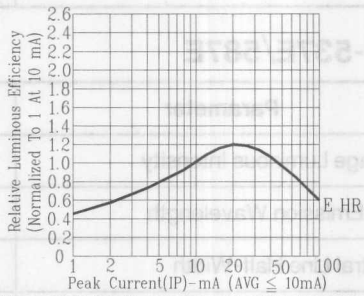


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

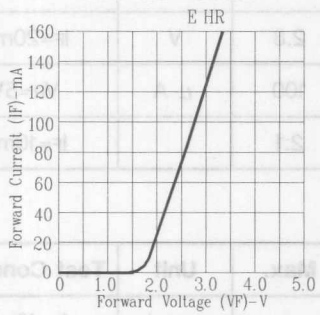


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

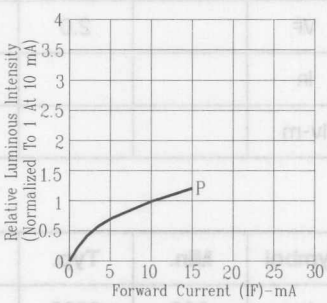


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

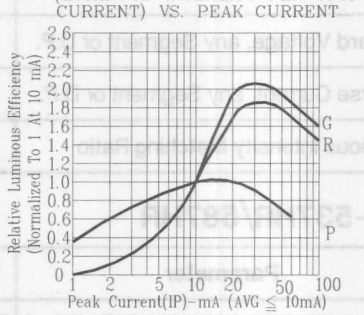


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

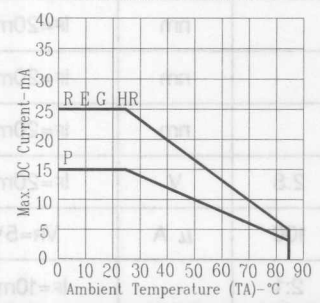


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.



Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

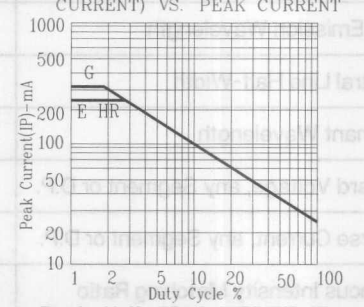


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: R=RED P=BRIGHT RED G=GREEN E=ORANGE HR=HI-EFF.RED (REFRESH RATE 1KHz)

0.54"Alphanumeric LED Displays

LTP-3784/3786 Series

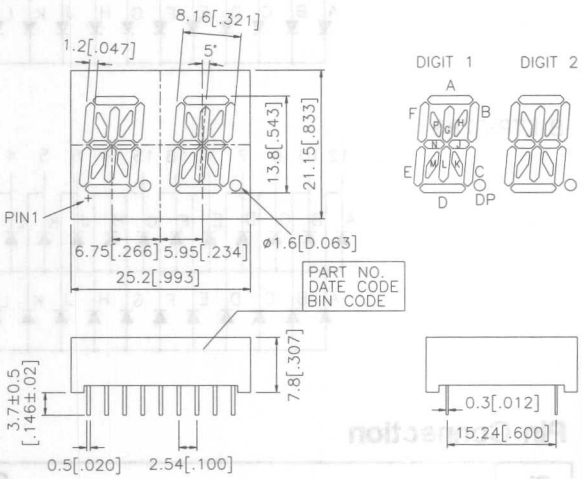
Features

- 0.54 inch (13.8mm) digit height.
- Continuous uniform segments.
- Choices of three bright colors-red/green/orange.
- Low power requirements.
- Excellent character appearance.
- Wide viewing angle.
- Solid state reliability.
- Common anode or common cathode models.
- Categorized for luminous intensity.
- Easy mounting on P.C. board.

Description

The LTP-3784/3786 series are 0.54 inch (13.8mm) height 14-segment dual digit alphanumeric displays. The dual digit displays have gray face and white segments. The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.

Package Dimensions



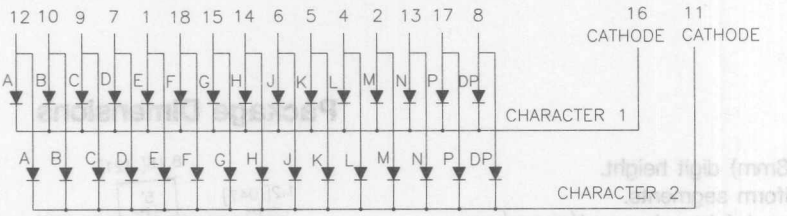
Notes: All dimensions are in millimeters(inches).
Tolerance: ± 0.25mm (0.010") unless otherwise noted.

Devices

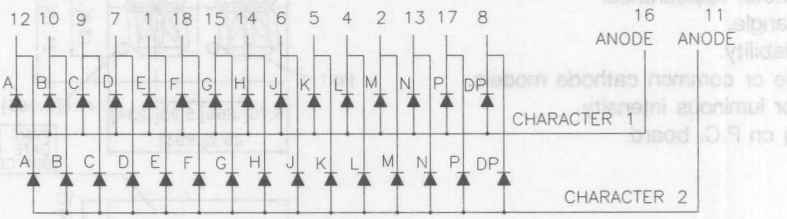
Part No.			Description	Internal Circuit Diagram
Red	Green	Orange		
LTP-3784R	LTP-3784G	LTP-3784E	Multiplex Common Cathode, Rt. Hand Decimal	A
LTP-3786R	LTP-3786G	LTP-3786E	Multiplex Common Anode, Rt. Hand Decimal	B

Internal Circuit Diagrams

A. LTP-3784



B. LTP-3786



Pin Connection

Pin No.	Connection	
	A. LTP-3784	B. LTP-3786
1	Anode E	Cathode E
2	Anode M	Cathode M
3	No Connection	No Connection
4	Anode L	Cathode L
5	Anode K	Cathode K
6	Anode J	Cathode J
7	Anode D	Cathode D
8	Anode D.P.	Cathode D.P.
9	Anode C	Cathode C
10	Anode B	Cathode B
11	Common Cathode, Character 2	Common Anode, Character 2
12	Anode A	Cathode A
13	Anode N	Cathode N
14	Anode H	Cathode H
15	Anode G	Cathode G
16	Common Cathode, Character 1	Common Anode, Character 1
17	Anode P	Cathode P
18	Anode F	Cathode F

Absolute Maximum Rating at Ta=25 ℃

Parameter	Red	Green	Orange	Unit
Power Dissipation Per Segment	55	75	75	mW
Peak Forward Current Per Segment ($^1/_{10}$ Duty Cycle, 0.1ms Pulse Width)	150	100	100	mA
Continuous Forward Current Per Segment Derating Linear From 25℃ Per Segment	25 0.33	25 0.33	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	5	V
Operating Temperature Range	-35 ℃ to +85 ℃			
Storage Temperature Range	-35 ℃ to +85 ℃			
Solder Temperature $^1/_{16}$ inch Below Seating Plane for 3 Seconds at 260 ℃				

Electrical / Optical Characteristics at Ta=25 ℃

LTP-3784R/3786R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	400		μ cd	IF=10mA
Peak Emission Wavelength	λ P		655		nm	IF=20mA
Spectrial Line Half-Width	Δ λ		24		nm	IF=20mA
Dominant Wavelength	λ d		651		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		1.7	2.0	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-3784G/3786G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	500	1800		μ cd	IF=10mA
Peak Emission Wavelength	λ P		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTP-3784E/3786E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	500	1800		μ cd	IF=10mA
Peak Emission Wavelength	λ P		630		nm	IF=20mA
Spectral Line Half-Width	Δ λ		40		nm	IF=20mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.0	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical / Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

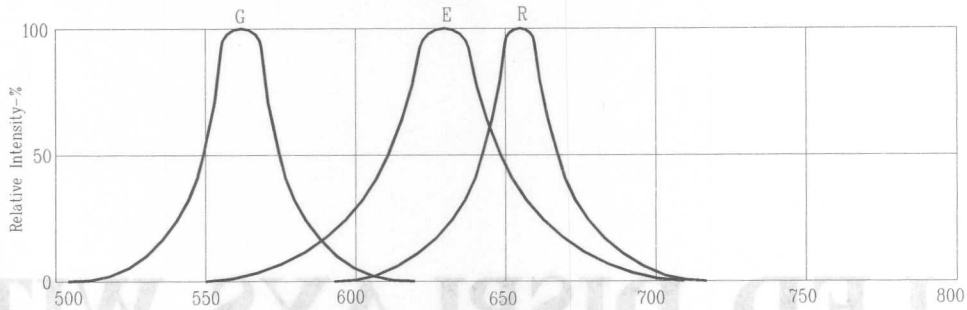


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

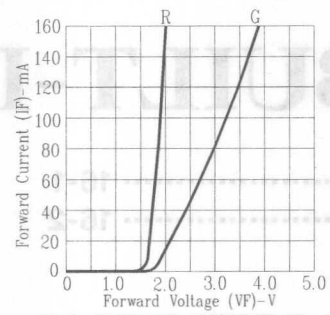


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

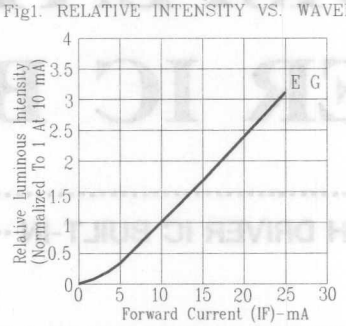


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

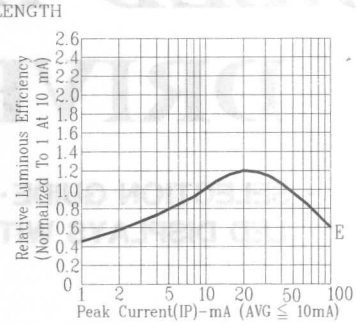


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

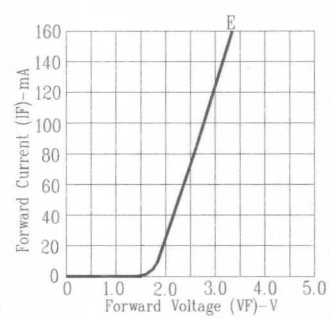


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

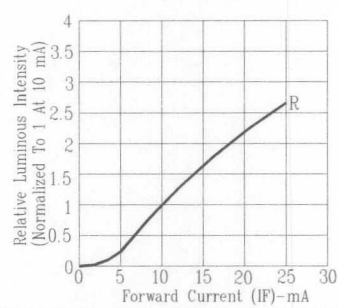


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

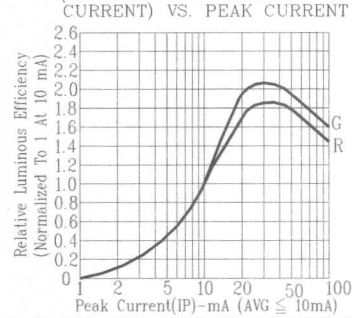


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

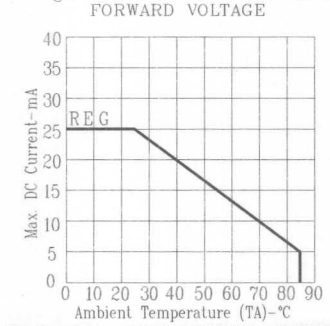


Fig8. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

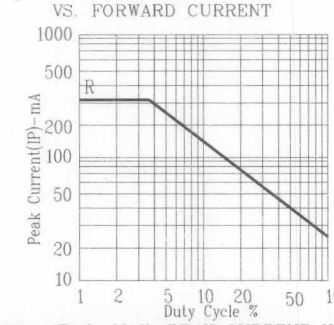


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

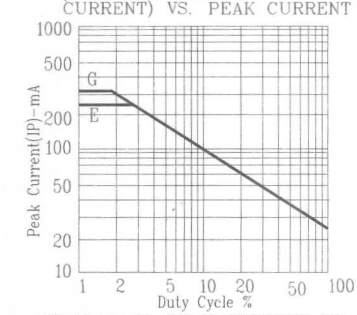


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

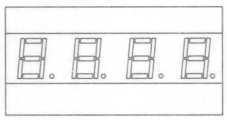
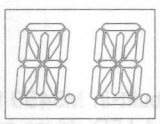
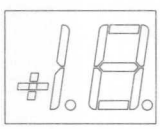
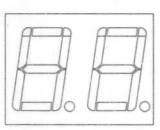
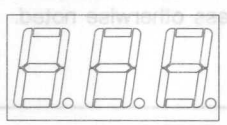
NOTE: R=RED G=GREEN E=ORANGE (REFRESH RATE 1KHz)

16. LED DISPLAYS WITH DRIVER IC BUILT-IN

· SELECTION GUIDE ····· 16-1
· LED DISPLAYS WITH DRIVER IC BUILT-IN ····· 16-2

Selection Guide

· LED Displays With Driver I.C. Built-In

Package	Part No.	Color(λ P)	Description	Typ.Iv/SEG. IB=0.4mA	Page No.
 7.62mm(.3") Single-In-Line .8"H × 1.6"W × .23"D Air Type	LTM- 8328PKR-04 8328GKR-04	Bright Red (697nm) Green (565nm)	Four Digit, Rt. Hand Decimal With 2 Extra Output Bits	155 μ cd 220 μ cd	16-2
 13.8mm(.54") Dual-In-Line .74"H × 1."W × .3"D Epoxy Type	LTM- 8647AR 8647AP 8647AG 8647AY 8647AE 8647AHR	Red (655nm) Bright Red (697nm) Green (565nm) Yellow (585nm) Orange (630nm) Hi.-Eff. Red (635nm)	Dual Character, With 4 Extra Output Bits	400 μ cd 650 μ cd 1800 μ cd 1800 μ cd 1800 μ cd 1800 μ cd	16-7
 14.22mm(.56") Dual-In-Line .75"H × 1"W × .32"D Epoxy Type	LTM- 8529R 8529P 8529G 8529Y 8529E 8529HR	Red (655nm) Bright Red (697nm) Green (565nm) Yellow (585nm) Orange (630nm) Hi.-Eff. Red (635nm)	1 1/2 Digit, Rt. Hand Decimal With 8 Extra Output Bits	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	16-13
 14.22mm(.56") Dual-In-Line .75"H × 1"W × .32"D Epoxy Type	LTM- 8530R 8530P 8530G 8530Y 8530E 8530HR	Red (655nm) Bright Red (697nm) Green (565nm) Yellow (585nm) Orange (630nm) Hi.-Eff. Red (635nm)	Dual Digit, Rt. Hand Decimal With 8 Extra Output Bits	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	
 14.22mm(.56") Dual-In-Line .75"H × 1.5"W × .32"D Epoxy Type	LTM- 8522R 8522P 8522G 8522Y 8522E 8522HR	Red (655nm) Bright Red (697nm) Green (565nm) Yellow (585nm) Orange (630nm) Hi.-Eff. Red (635nm)	Triple Digit, Rt. Hand Decimal With 10 Extra Output Bits	600 μ cd 950 μ cd 2400 μ cd 2400 μ cd 2400 μ cd 2400 μ cd	

LITEON

0.3" Four Digit 7-Segment Numeric LED Displays With MOS I.C. Driver

LTM-8328XKR Series

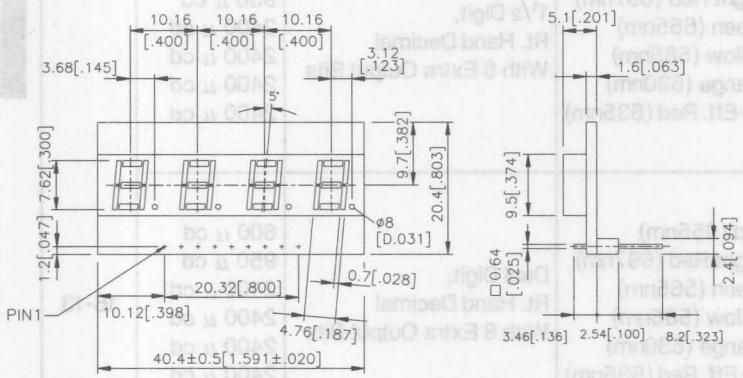
Features

- 0.3 inch (7.62mm) digit height.
- Four-Digit,right hand decimal.
- Wide supply voltage operation.
- Serial data input.
- Constant current drivers.
- Continuous brightness control.
- Output available for two external LEDS.
- Wide viewing angle.
- Choices of two bright colors-bright red/green.
- TTL compatible.

Description

The LTM-8328KR series are 0.3 inch (7.62mm) height numeric display modules, having a built-in M5450 MOS integrated circuits. The integrated circuit contains serial data input, 35 bit shift registers. 34 LED driver output and a brightness control. The bright red and green devices utilize LED chips which are made from GaP on a transparent GaP substrate. The MOS integrated circuits are produced with N-channel silicon gate technology. All the displays have black face with white diffusion tape.

Package Dimensions



Notes: All dimensions are in millimeters (inches).
Tolerance :
±0.25mm (0.010") unless otherwise noted.

Devices

Part No.		Description
Bright Red	Green	
LTM-8328PKR-04	LTM-8328GKR-04	Four Digit R.H.D.P. With I.C. Driver

Pin Connection

Pin No.	Description
1	Ext LED 1
2	Ext LED 2
3	Data Enable
4	Data Serial
5	Clock
6	VDD
7	Dimmer
8	GND
9	VLED

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Symbol	Min.	Max.	Units
Supply Voltage * 1	V_{DD}	-0.3	12	V
Input Voltage	V_I	-0.3	12	V
Off State Output Voltage	$V_{O(off)}$		12	V
LED Supply Voltage	V_{LED}	2.8	3.5	V
Power Dissipation of IC * 2	$P_{D(IC)}$		335	mW
Supply Current	I_{DD}		8.5	mA
Operating Temperature Range	T_{op}	-20	+60	℃
Storage Temperature Range	T_{stg}	-20	+60	℃
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃				

Notes:1. All voltages are with respect to Vss(GND)

2. Power dissipation of IC is given by $P_D=(V_{LED}-V_F)\cdot(I_F)\cdot(\text{No. of Segments})+(8.5mA)\cdot(V_{DD})$
   *V_F is LED forward voltage.

Recommended Operating Condition at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Supply Voltage	V_{DD}	4.75		11	V	
Input Voltage						
Logical "0" Level	V_I	-0.3		0.8	V	± 10 μ A Input Bias
Logical "1" Level		2.2		V_{DD}	V	4.75V < V_{DD} < 5.25V
Logical "1" Level		V_{DD} -2		V_{DD}	V	V_{DD} > 5.25V
Brightness Input Current	I_B	0		0.75	mA	
Brightness Input Voltage	V_B	3		4.3	V	Input Current =750 μ A
Off State Voltage	Vo(off)			11	V	
Output Sink Current						
Segment Off				10	μ A	I_B=0 μ A
Segment On			3		mA	I_B=100 μ A
			6		mA	I_B=200 μ A
Input Clock Frequency	F_{CLOCK}	0		0.5	MHZ	
Output Matching	Io			± 20	%	

Electrical/Optical Characteristics at Ta=25 ℃

LTM-8328PKR-04

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	79	155		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		697		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		90		nm	I_B=0.4mA
Dominant Wavelength	λ d		638		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8328GKR-04

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	125	220		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		565		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		30		nm	I_B=0.4mA
Dominant Wavelength	λ d		569		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

Functional Description

Serial data transfer from the data source to the display driver is accomplished with 2 signals serial data and colck. Using a format of a leading "1" followed by the 35 data bits allows data transfer without an additional load signal. The 35 data bits are latched after the 36th bit is completed, thus providing nonmultiplexed, direct drive to the display. Outputs change only if the serial data bits differ from the previous time.

Brightness of display is determined by control the output current of LED display. A 1nF capacitor should be connected to brightness control, Pin 7 to prevent possible oscillations. The output current is typically 25 times greater than the current into Pin 7 which is set by an external variable resistor. There is an internal limiting resistor of 400 Ω nominal value.

Figure 1 shows the input data format. A start bit of logical "1" preceed the 35 bits of data. At the 36th clock, a LOAD signal is generated synchronously with the high state of the clock, which loads the 35 bits of the shift registers into the latches. At the low state of the clock a RESET signal is generated which clears all the shift registers for the next set of data . The shift registers are static master-salve configuration. There is no clear for master portion of the first register, thus allowing continuous operation.

There must be a complete set of 36 clocks or the shift registers won't clear. When power is first applied to the chip, an internal power ON, a reset signal is generated which reset all registers and all latches. The START bit and first clock return the chip on its normal operation. Bit 1 is the first following the start bit and it will appear on the segment A of the digit 1. A logical "1" at the input will turn on the appropriate LED. Figure 2 shows the timing relationship between data, clock, and DATA ENABLE. A max. clock frequency of 0.5MHz is assumed.

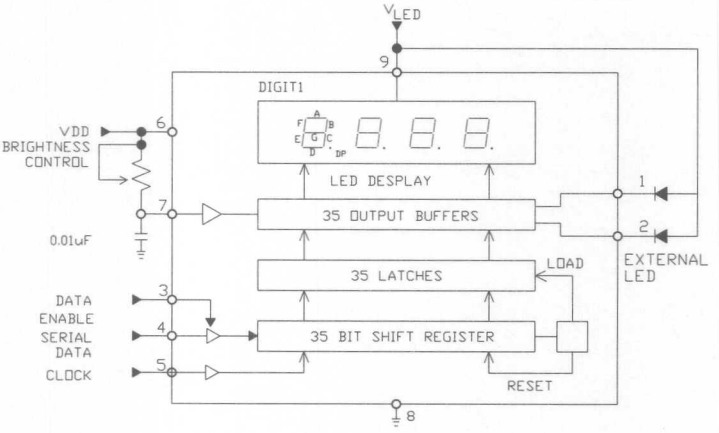


Figure 1. Internal Block Diagram

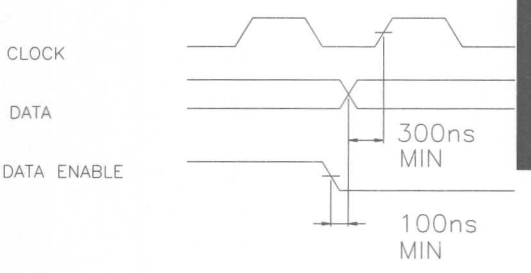


Figure 2. Input Data Format

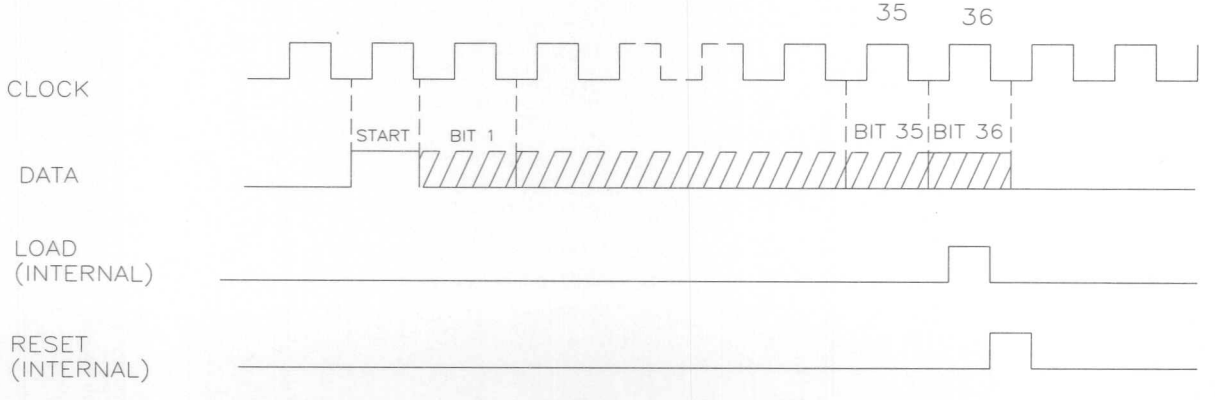


Figure 3. Timing Relationship

Table I Serial Data Input Sequence

Bit	Digit	Segment	Bit	Digit	Segment
1	1	A	18	3	B
2	1	B	.19	3	C
3	1	C	20	3	D
4	1	D	21	3	E
5	1	E	22	3	F
6	1	F	23	3	G
7	1	G	24	3	DP
8	1	DP	25	4	A
9	2	A	26	4	B
10	2	B	27	4	C
11	2	C	28	4	D
12	2	D	29	4	E
13	2	E	30	4	F
14	2	F	31	4	G
15	2	G	32	4	DP
16	2	DP	33		LED 1
17	3	A	34		LED 2

0.54" 2-Character 14-Segment Alphanumeric LED Displays With MOS I.C. Driver

LTM-8647A Series

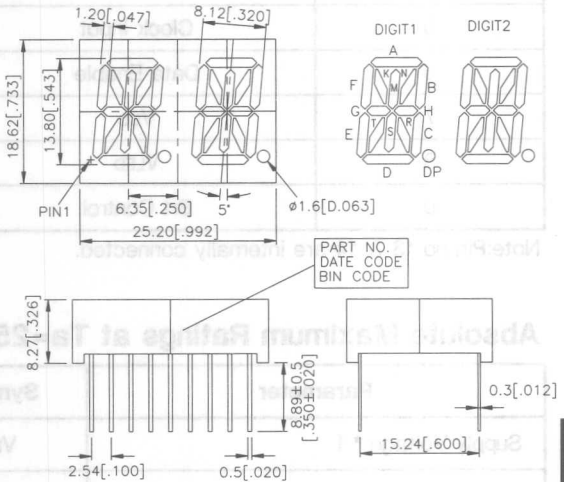
Features

- 0.54 inch (13.8mm) digit height, 14-segment character.
- Wide supply voltage operation.
- Serial data input.
- Constant Current drivers.
- Continuous brightness control.
- Solid state reliability, long operation life.
- Wide viewing angle.
- Choices of six bright colors-yellow/red/bright-red/green/orange/high efficiency red.
- TTL compatible.

Description

The LTM-8647A series are dual character 14-segment alphanumeric display modules, having a built-in M5450 MOS integrated circuits. The integrated circuit contains serial data input, 35 bit shift registers. 34 LED driver output and a brightness control. The red devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green, yellow devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange and high efficiency red devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. The MOS integrated circuit are produced with N-channel silicon gate technology. Red and bright red displays have black face and red segments . Green and yellow, orange displays have gray face and white segments. High efficiency red displays have red face and red segments.

Package Dimensions



Notes: All dimensions are in millimeters (inches).
Tolerance :
± 0.25mm (0.010") unless otherwise noted.

Devices

Part No. LTM-						Description
Yellow	Red	Bright Red	Green	Orange	Hi.-Eff.Red	
8647AY	8647AR	8647AP	8647AG	8647AE	8647AHR	Dual Character, with I.C. Driver

Pin Connection

Pin No.	Description	Pin No.	Description
1	Bit 32 Output	10	No Pin
2	Bit 33 Output	11	No Pin
3	Bit 34 Output	12	No Pin
4	Data Input	13	V_{SS}* 1
5	Clock Input	14	V_{SS}* 1
6	Data Enable	15	No Pin
7	V_{DD}	16	No Pin
8	V_{LED}	17	Bit 31 Output
9	Brt Control	18	No Pin

Note:Pin no 13 & 14 are internally connected.

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Symbol	Min.	Max.	Units
Supply Voltage * 1	V_{DD}	-0.3	12	V
Input Voltage	V_I	-0.3	12	V
Off State Output Voltage	$V_{O(off)}$		12	V
LED Supply Voltage	V_{LED}	2.8	3.5	V
Power Dissipation of IC * 2	P_D(IC)		335	mW
Supply Current	I_{DD}		8.5	mA
Operating Temperature Range	T_{op}	-20	+60	℃
Storage Temperature Range	T_{stg}	-20	+60	℃
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃				

Note: 1. All voltages are with respect to Vss(GND)
2. Power dissipation of IC is given by $P_D=(V_{LED}-V_F) \cdot (I_F) \cdot$ (No. of Segments)+(8.5mA) $\cdot (V_{DD})$
*V_F is LED forward voltage.

Recommended Operating Condition at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Supply Voltage	V_{DD}	4.75		11	V	
Input Voltage						
Logical "0" Level	V_I	-0.3		0.8	V	± 10 μ A Input Bias
Logical "1" Level		2.2		V_{DD}	V	4.75V < V_{DD} < 5.25V
Logical "1" Level		V_{DD} -2		V_{DD}	V	V_{DD} > 5.25V
Brightness Input Current	I_B	0		0.75	mA	
Brightness Input Voltage	V_B	3		4.3	V	Input Current =750 μ A
Off State Voltage	V_O(off)			11	V	
Output Sink Current						
Segment Off				10	μ A	I_B=0 μ A
Segment On			3		mA	I_B=100 μ A
			6		mA	I_B=200 μ A
Input Clock Frequency	F_{CLOCK}	0		0.5	MHZ	
Output Matching	Io			± 20	%	

Electrical/Optical Characteristics at Ta=25 ℃

LTM-8647AR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	200	550		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		655		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		24		nm	I_B=0.4mA
Dominant Wavelength	λ d		651		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8647AP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	900		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		697		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		90		nm	I_B=0.4mA
Dominant Wavelength	λ d		638		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8647AG

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2300		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		565		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		30		nm	I_B=0.4mA
Dominant Wavelength	λ d		569		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8647AY

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2300		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		585		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		35		nm	I_B=0.4mA
Dominant Wavelength	λ d		588		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8647AE

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2300		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		630		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		40		nm	I_B=0.4mA
Dominant Wavelength	λ d		621		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8647AHR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2300		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		635		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		40		nm	I_B=0.4mA
Dominant Wavelength	λ d		621		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

Functional Description

Serial data transfer from the data source to the display driver is accomplished with 2 signals serial data and colck. Using a format of a leading "1" followed by the 35 data bits allows data transfer without an additional load signal. The 35 data bits are latched after the 36th bit is completed, thus provding nonmultiplexed, direct drive to the display. Output change only if the serial data bits differ from the previous time.

Brightness of display is determined by control the output current of LED display. A 1nF capacitor ahould be connected to brightness control, Pin 7 to prevent possible oscillations. The output current is typically 25 times greater than the current into Pin 7 which is set by an external variable resistor. There is an internal limiting resistor of 400 Ω nominal value.

Figure 1 shows the input data format. A start bit of logical "1" preceed the 35 bits of data. At the 36th clock, a LOAD signal is generated synchronously with the high state of the clock, which loads the 35 bits of the shift registers into the latches. At the low state of the clock a RESET signal is generated which clears all the shift registers for the next set of data . The shift registers are static master-salve configuration. There is no clear for master portion of the first register, thus allowing continuous operation.

There must be a complete set of 36 clocks or the shift registers won't clear. When power is first applied to the chip, an internal power ON, a reset signal is generated which reset all registers and all latches. The START bit and first clock return the chip on its normal operation. Bit 1 is the first following the start bit and it will appear on the segment A of the digit 1. A logical "1" at the input will turn on the appropriate LED. Figure 2 shows the timing relationship between data, clock, and DATA ENABLE. A max. clock frequency of 0.5MHz is assumed.

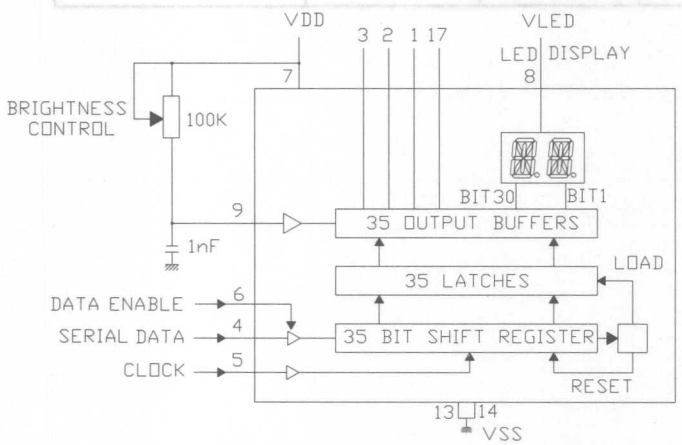


Figure 1. Internal Block Diagram

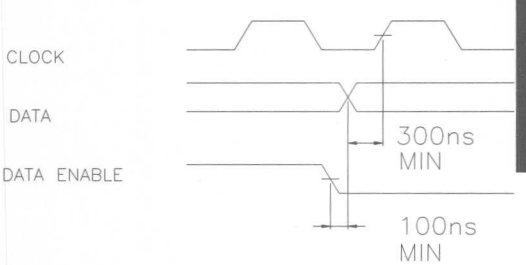


Figure 2. Input Data Format

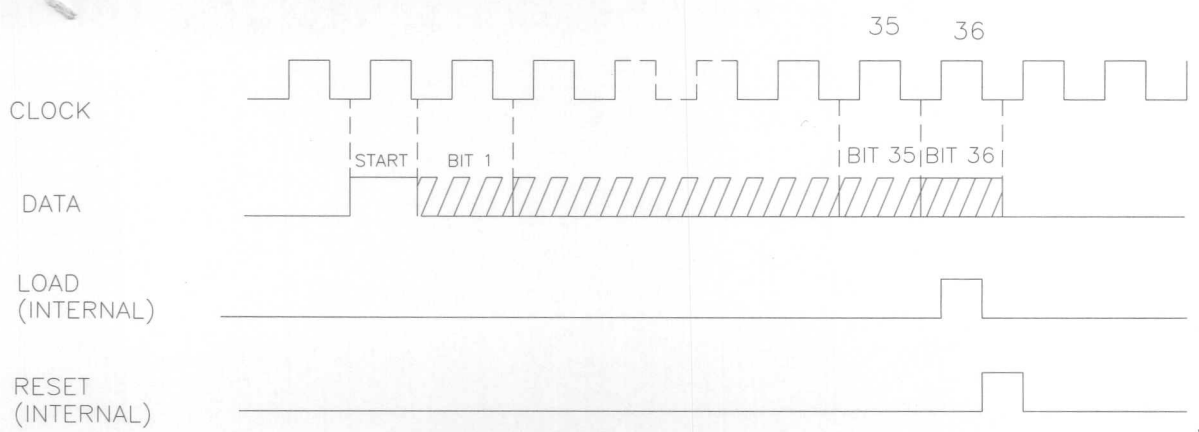


Figure 3. Timing Relationship

Table I Serial Data Input Sequence

Bit	Digit	Segment	Bit	Digit	Segment
1	2	A	18	1	D
2	2	B	.19	1	E
3	2	C	20	1	F
4	2	D	21	1	G
5	2	E	22	1	H
6	2	F	23	1	K
7	2	G	24	1	M
8	2	H	25	1	N
9	2	K	26	1	R
10	2	M	27	1	S
11	2	N	28	1	T
12	2	R	29	1	DP
13	2	S	30	2	DP
14	2	T	31		Pin 17
15	1	A	32		Pin 1
16	1	B	33		Pin 2
17	1	C	34		Pin 3

LITEON 0.56" 7-Segment Numeric LED Displays With MOS I.C. Driver

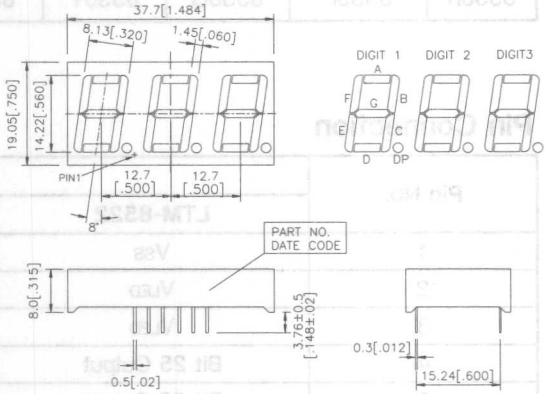
LTM-8500 Series

Features

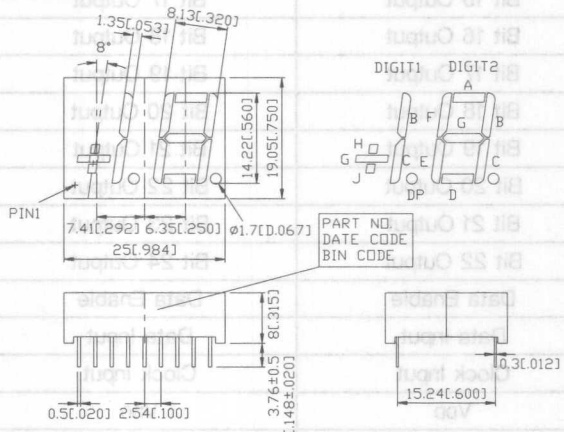
- 0.56 inch (14.22mm) digit height.
- Wide supply voltage operation.
- Serial data input.
- Constant Current drivers.
- Continuous brightness control.
- Solid state reliability-long operation life.
- Wide viewing angle.
- Choices of six bright colors-red/bright red/green /yellow/orange/high efficiency red.
- TTL compatible.

Package Dimensions

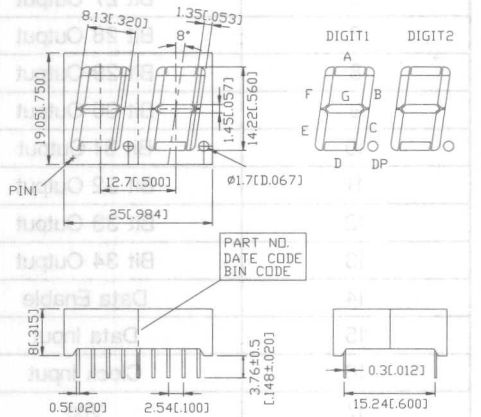
A. LTM-8522



B. LTM-8529



C. LTM-8530



Notes: All dimensions are in millimeters (inches). Tolerance : ±0.25mm (0.010") unless otherwise noted.

Description

The LTM-8500 series are 0.56 inch (14.22mm) numeric display modules, and a built-in M5450 MOS integrated circuits. The integrated circuit contains serial data input, 35 bits shift register. 34 LED driver output and a brightness control.

The red devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange and high efficiency red devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. The MOS integrated circuits are produced with N-channel silicon gate technology.

Red and bright red displays have black face and red segments. Green and yellow displays have gray face and white segments. Orange displays have orange face and orange segments. High efficiency red displays have red face and red segments.

Devices

Part No. LTM-						Description	Package Dimension
Red	Bright Red	Green	Yellow	Orange	Hi.Eff.Red		
8522R	8522P	8522G	8522Y	8522E	8522HR	3 Digit, Rt. Hand Decimal	A
8529R	8529P	8529G	8529Y	8529E	8529HR	1½ Digit, Rt. Hand Decimal	B
8530R	8530P	8530G	8530Y	8530E	8530HR	2 Digit, Rt. Hand Decimal	C

Pin Connection

Pin No.	Connection		
	LTM-8522	LTM-8529	LTM-8530
1	V_{SS}	V_{SS}	V_{SS}
2	V_{LED}	V_{LED}	V_{LED}
3	V_{LED}	No Pin	No Pin
4	Bit 25 Output	No Pin	No Pin
5	Bit 26 Output	No Pin	No Pin
6	Bit 27 Output	Bit 15 Output	Bit 17 Output
7	Bit 28 Output	Bit 16 Output	Bit 18 Output
8	Bit 29 Output	Bit 17 Output	Bit 19 Output
9	Bit 30 Output	Bit 18 Output	Bit 20 Output
10	Bit 31 Output	Bit 19 Output	Bit 21 Output
11	Bit 32 Output	Bit 20 Output	Bit 22 Output
12	Bit 33 Output	Bit 21 Output	Bit 23 Output
13	Bit 34 Output	Bit 22 Output	Bit 24 Output
14	Data Enable	Data Enable	Data Enable
15	Data Input	Data Input	Data Input
16	Clock Input	Clock Input	Clock Input
17	V_{DD}	V_{DD}	V_{DD}
18	BRT. Control	BRT. Control	BRT. Control

Absolute Maximum Ratings at Ta=25 ℃

Parameter	Symbol	Min.	Max.	Units
Supply Voltage * 1	V_{DD}	-0.3	12	V
Input Voltage	V_I	-0.3	12	V
Off State Output Voltage	$V_{O(off)}$		12	V
LED Supply Voltage	V_{LED}	2.8	3.5	V
Power Dissipation of IC * 2	P_D(IC)		335	mW
Supply Current	I_{DD}		8.5	mA
Operating Temperature Range	T_{op}	-20	+60	℃
Storage Temperature Range	T_{stg}	-20	+60	℃
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃				

Note: 1. All voltages are with respect to Vss(GND)
2. Power dissipation of IC is given by $P_D=(V_{LED}-V_F) \cdot (I_F) \cdot$ (No. of Segments)+(8.5mA) $\cdot$ (V_{DD})
*V_F is LED forward voltage.

Recommended Operating Condition at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Supply Voltage	V_{DD}	4.75		11	V	
Input Voltage						
Logical "0" Level	V_I	-0.3		0.8	V	± 10 μ A Input Bias
Logical "1" Level		2.2		V_{DD}	V	4.75V < V_{DD} < 5.25V
Logical "1" Level		V_{DD} -2		V_{DD}	V	V_{DD} > 5.25V
Brightness Input Current	I_B	0		0.75	mA	
Brightness Input Voltage	V_B	3		4.3	V	Input Current =750 μ A
Off State Voltage	$V_{O(off)}$			11	V	
Output Sink Current						
Segment Off				10	μ A	I_B=0 μ A
Segment On			3		mA	I_B=100 μ A
			6		mA	I_B=200 μ A
Input Clock Frequency	F_{CLOCK}	0		0.5	MHZ	
Output Matching	I_O			± 20	%	

Electrical/Optical Characteristics at Ta=25 ℃

LTM-8522R/8529R/8530R

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	210	600		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		655		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		40		nm	I_B=0.4mA
Dominant Wavelength	λ d		651		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8522P/8529P/8530P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	320	950		μ cd	I_B=0.4mA
Peak Emission Wavelength	λ P		697		nm	I_B=0.4mA
Spectral Line Half-Width	Δ λ		90		nm	I_B=0.4mA
Dominant Wavelength	λ d		638		nm	I_F=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B=0.4mA

LTM-8522G/8529G/8530G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IB=0.4mA
Peak Emission Wavelength	λ P		565		nm	IB=0.4mA
Spectral Line Half-Width	Δ λ		30		nm	IB=0.4mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		IB=0.4mA

LTM-8522Y/8529Y/8530Y

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IB=0.4mA
Peak Emission Wavelength	λ P		585		nm	IB=0.4mA
Spectral Line Half-Width	Δ λ		35		nm	IB=0.4mA
Dominant Wavelength	λ d		588		nm	IF=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		IB=0.4mA

LTM-8522E/8529E/8530E

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IB=0.4mA
Peak Emission Wavelength	λ P		630		nm	IB=0.4mA
Spectral Line Half-Width	Δ λ		40		nm	IB=0.4mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		IB=0.4mA

LTM-8522HR/8529HR/8530HR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	800	2400		μ cd	IB=0.4mA
Peak Emission Wavelength	λ P		635		nm	IB=0.4mA
Spectral Line Half-Width	Δ λ		40		nm	IB=0.4mA
Dominant Wavelength	λ d		621		nm	IF=20mA
Luminous Intensity Matching Ratio	Iv-m			2:1		IB=0.4mA

Functional Description

Serial data transfer from the data source to the display driver is accomplished with 2 signals serial data and colck. Using a format of a leading "1" followed by the 35 data bits allow data transfer without an additional load signal. The 35 data bits are latched after the 36th bit is completed, thus providing nonmultiplexed, direct drive to the display. Outputs change only if the serial data bits differ from the previous time.

Brightness of display is determined by control the output current of LED display. A 1nF capacitor should be connected to brightness control, Pin 7 to prevent possible oscillations. The output current is typically 25 times greater than the current into Pin 7 which is set by an external variable resistor. There is an internal limiting resistor of 400 Ω nominal value.

Figure 1 shows the input data format. A start bit of logical "1" preceed the 35 bits of data. At the 36th clock, a LOAD signal is generated synchronously with the high state of the clock, which loads the 35 bits of the shift registers into the latches. At the low state of the clock a RESET signal is generated which clears all the shift registers for the next set of data . The shift registers are static master-slave configuration. There is no clear for master portion of the first register, thus allowing continuous operation.

There must be a complete set of 36 clocks or the shift registers won't clear. When power is first applied to the chip, an internal power ON, a reset signal is generated which reset all registers and all latches. The START bit and first clock return the chip on its normal operation. Bit 1 is the first following the start bit and it will appear on the segment A of the digit 1. A logical "1" at the input will turn on the appropriate LED. Figure 2 shows the timing relationship between data, clock, and DATA ENABLE. A max. clock frequency of 0.5MHz is assumed.

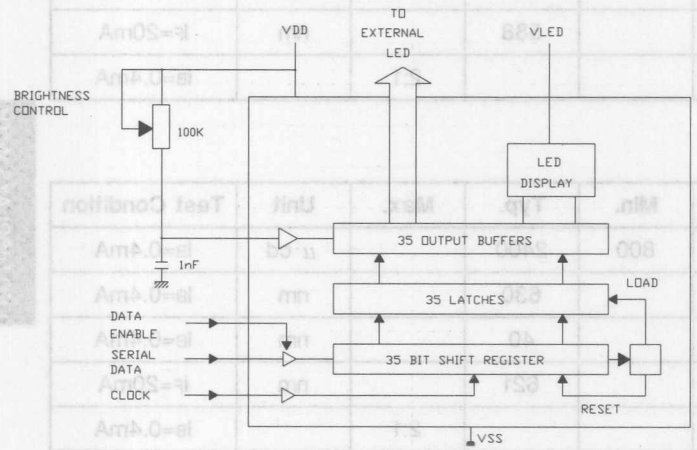


Figure 1. Internal Block Diagram

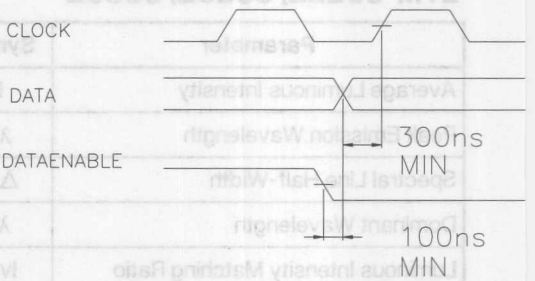


Figure 2. Input Data Format

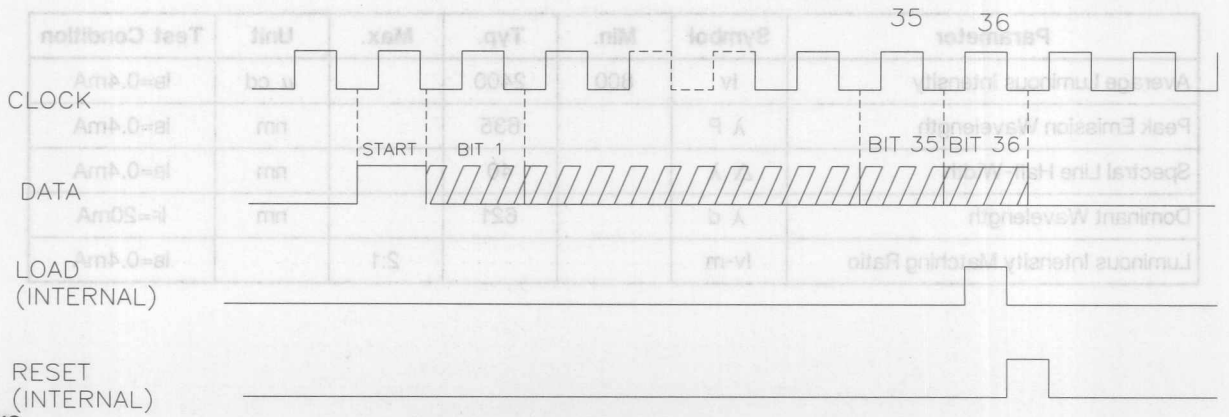


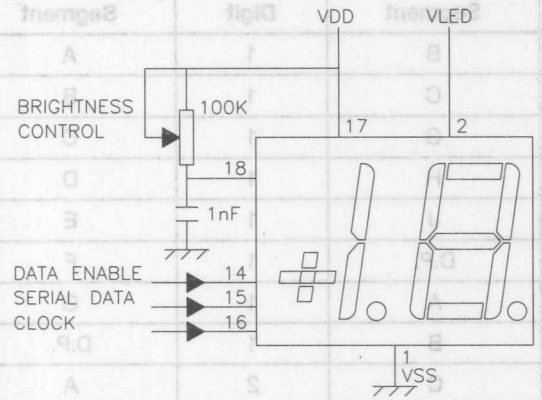
Figure 3. Timing Relationship

Table I Serial Data Input Sequence

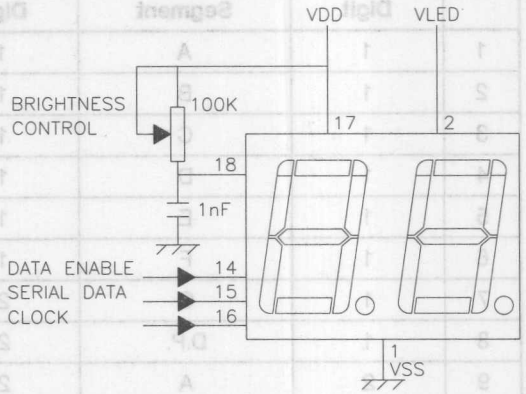
Bit	LTM-8522		LTM-8529		LTM-8530	
	Digit	Segment	Digit	Segment	Digit	Segment
1	1	A	1	B	1	A
2	1	B	1	C	1	B
3	1	C	1	G	1	C
4	1	D	1	H	1	D
5	1	E	1	J	1	E
6	1	F	1	D.P.	1	F
7	1	G	2	A	1	G
8	1	D.P.	2	B	1	D.P.
9	2	A	2	C	2	A
10	2	B	2	D	2	B
11	2	C	2	E	2	C
12	2	D	2	F	2	D
13	2	E	2	G	2	E
14	2	F	2	D.P.	2	F
15	2	G		Pin 6	2	G
16	2	D.P.		Pin 7	2	D.P.
17	3	A		Pin 8		Pin 6
18	3	B		Pin 9		Pin 7
19	3	C		Pin 10		Pin 8
20	3	D		Pin 11		Pin 9
21	3	E		Pin 12		Pin 10
22	3	F		Pin 13		Pin 11
23	3	G		No Connection		Pin 12
24	3	D.P.		No Connection		Pin 13
25		Pin 4		No Connection		No Connection
26		Pin 5		No Connection		No Connection
27		Pin 6		No Connection		No Connection
28		Pin 7		No Connection		No Connection
29		Pin 8		No Connection		No Connection
30		Pin 9		No Connection		No Connection
31		Pin 10		No Connection		No Connection
32		Pin 11		No Connection		No Connection
33		Pin 12		No Connection		No Connection
34		Pin 13		No Connection		No Connection

Typical Application

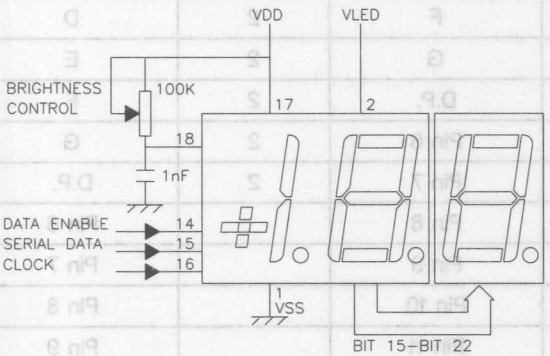
A.1½DIGIT DISPLAY



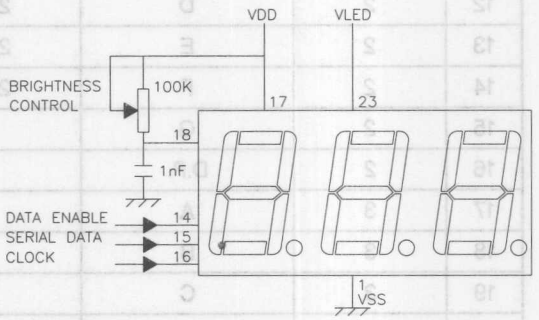
B.2 DIGIT DISPLAY



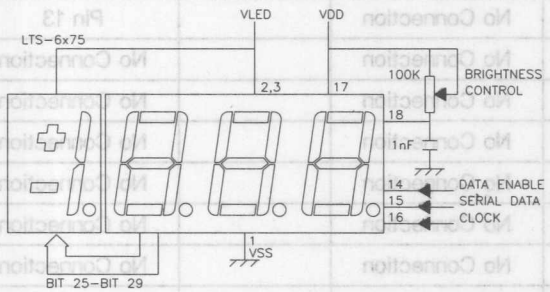
C. 2½DIGIT DISPLAY



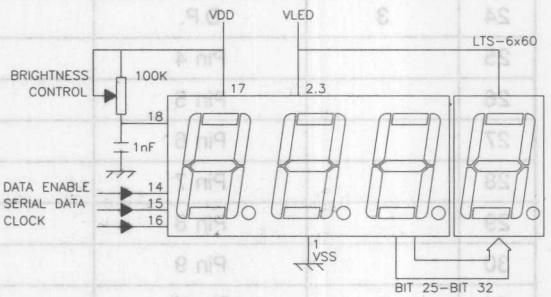
D. 3 DIGIT DISPLAY



E. 3 ½DIGIT DISPLAY



F. 4 DIGIT DISPLAY



NOTES:1.Clean only in water,isopropanol, ethanol,freon TF(or equivalent).

2.Luminous intensity is measured with a light sensor and filter combination thar approximates the CIE (Commission International De L'Eclairage)eye-response curve.

17. CLOCK LED DISPLAYS

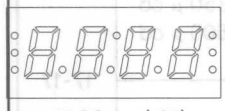
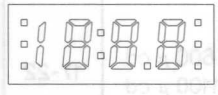
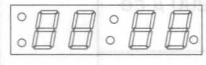
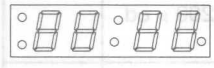
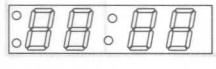
- SELECTION GUIDE 17-1
- CLOCK LED DISPLAYS 17-3

17. CLOCK LED DISPLAYS

· SELECTION GUIDE ····· 17-1
· CLOCK LED DISPLAYS ····· 17-3

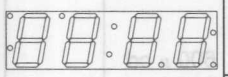
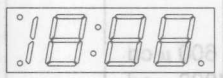
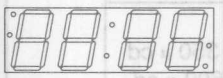
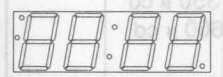
Selection Guide

· Clock LED Displays

Package	Part No.	Color(λ p)	Description	Typ.Iv/Seg. @IF=10mA	Page No.
Epoxy Type  7.62mm(.3") Dual-In-Line .52"Hx1.2"Wx.28"D	LTC-3710P 3710G	Bright Red(697 nm) Green(565 nm)	Multiplex, Common Cathode, Full Feature	600 μ cd 1800 μ cd	17-3
Epoxy Type  7.62mm(.3") Dual-In-Line .54"Hx1.4"Wx.24"D	LTC-3718P 3718G	Bright Red(697 nm) Green(565 nm)	Multiplex, Common Cathode, Full Feature	600 μ cd 1800 μ cd	
Air Type  15mm(.6") Single-In-Line 1"Hx3.6"Wx.23"D	LTC-637D1P-12 637D1G-12	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 12 Hour Duplex, Common Cathode, 12 Hour	350 μ cd 600 μ cd	17-8
	LTC-637D1P 637D1G	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, Full Feature Duplex, Common Cathode Full Feature	350 μ cd 600 μ cd	
Air Type  15mm(.6") Single-In-Line 1"Hx3.6"Wx.23"D	LTC-637C1P-12 637C1G-12	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 12 Hour Duplex, Common Cathode, 12 Hour	350 μ cd 600 μ cd	
	LTC-637C1P 637C1G	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, Full Feature Duplex, Common Cathode Full Feature	350 μ cd 600 μ cd	
Air Type  15mm(.6") Single-In-Line 1"Hx3.6"Wx.23"D	LTC-6512PDK2 6512GDK2	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 12 Hour Duplex, Common Cathode, 12 Hour	350 μ cd 600 μ cd	17-13
	LTC-6512PDK4 6512GDK4	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 24 Hour Duplex, Common Cathode, 24 Hour	350 μ cd 600 μ cd	

Selection Guide

· Clock LED Displays

Package	Part No.	Color(λ p)	Description	Typ.Iv/Seg. @IF=10mA	Page No.
Air Type  23mm(.9") Single-In-Line 1.4"Hx4.1"Wx.32"D	LTC-937S1P 937S1G	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, Full Feature Duplex, Common Cathode Full Feature	350 μ cd 600 μ cd	17-17
	LTC-937S1P-12 937S1G-12	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 12 Hour Duplex, Common Cathode, 12 Hour	350 μ cd 600 μ cd	
Air Type  35mm(1.4") Single-In-Line 2.2"Hx6.2"Wx.3"D	LTC-14501A1P-2 14501A1G-2	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 12 Hour Duplex, Common Cathode, 12 Hour	600 μ cd 1100 μ cd	17-22
Air Type  46.7mm(1.8") Single-In-Line 2.2"Hx7.2"Wx.37"D	LTC-18501A1P 18501A1G	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, Full Feature Duplex, Common Cathode Full Feature	670 μ cd 1200 μ cd	17-27
	LTC-18501A1P-2 18501A1G-2	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 12 Hour Duplex, Common Cathode, 12 Hour	670 μ cd 1200 μ cd	
	LTC-18501A1P-4 18501A1G-4	Bright Red(697 nm) Green(565 nm)	Duplex, Common Cathode, 24 Hour Duplex, Common Cathode, 24 Hour	670 μ cd 1200 μ cd	
Air Type  63.4mm(2.5") Single-In-Line 3"Hx8.5"Wx.42"D	LTC-25501PAA	Bright Red(697 nm)	Duplex, Common Cathode, Full Feature	670 μ cd	17-32

0.3" Four Digit Clock LED Displays

LTC-3710 Series

Features

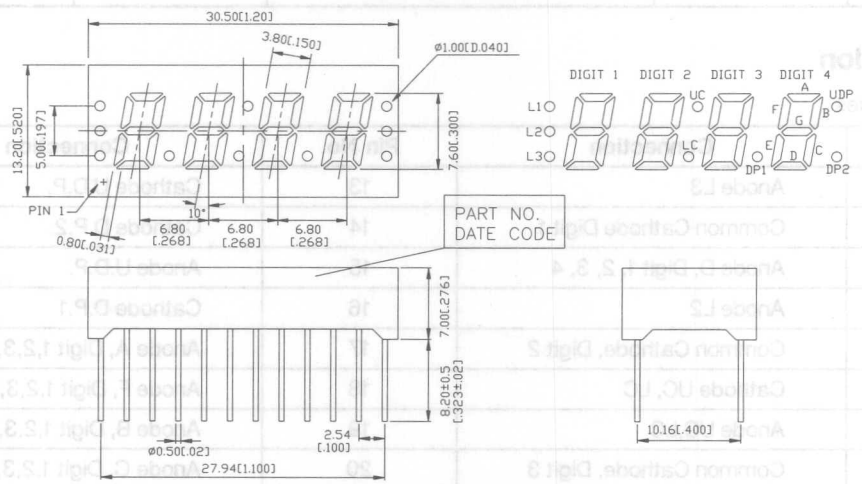
- 0.3 inch (7.62mm) digit height.
- Continuous uniform segments.
- Choices of two bright colors : bright red/green.
- Low power requirement.
- Excellent characters appearance.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. Compatible.
- Easy mounting on P.C. board or socket.

Description

The LTC-3710 series devices are 0.3 inch (7.62mm) height four digit displays.
The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. Bright red displays have black face and red segments. LTC-3710G have black face and white segments. LTC-3718G have gray face and white segments.

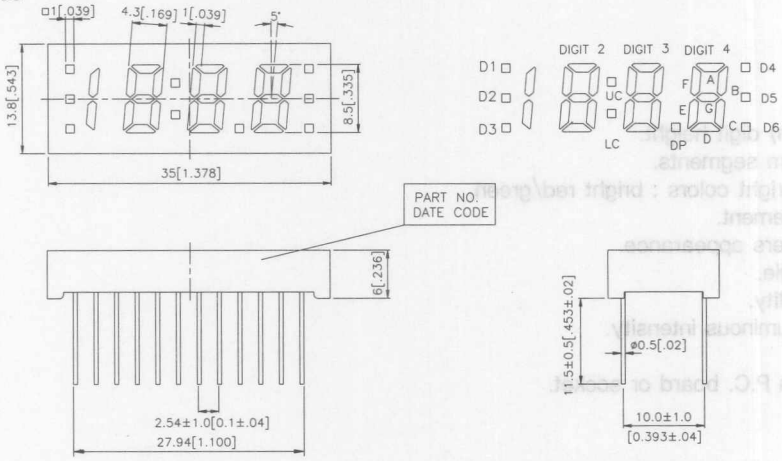
Package Dimensions

A. LTC-3710 Series



Notes:All dimensions are in millimeters (inches).Tolerance:
± 0.25mm (0.010") unless otherwise noted.

B. LTC-3718 Series



Notes:All dimensions are in millimeters (inches).Tolerance: ± 0.25mm (0.010") unless otherwise noted.

Devices

Part No. LTC-		Description	Package Dimension	Internal Circuit Diagram
Bright Red	Green			
3710P	3710G	Common Cathode	A	A
3718P	3718G	Common Cathode	B	B

Pin Connection

A. LTC-3710 Series

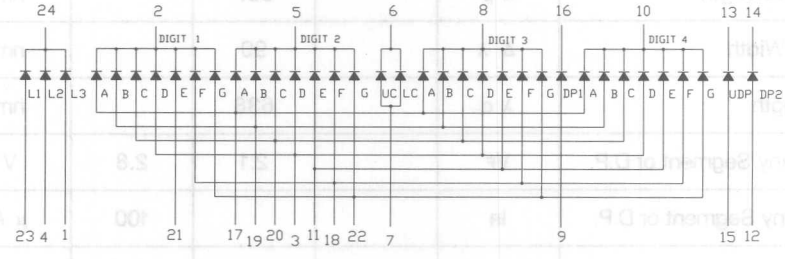
Pin No.	Connection	Pin No.	Connection
1	Anode L3	13	Cathode U.D.P.
2	Common Cathode Digit 1	14	Cathode D.P.2.
3	Anode D, Digit 1, 2, 3, 4	15	Anode U.D.P.
4	Anode L2	16	Cathode D.P.1
5	Common Cathode, Digit 2	17	Anode A, Digit 1,2,3,4
6	Cathode UC, LC	18	Anode F, Digit 1,2,3,4
7	Anode UC,LC	19	Anode B, Digit 1,2,3,4
8	Common Cathode, Digit 3	20	Anode C, Digit 1,2,3,4
9	Anode D.P.1	21	Anode E, Digit 1
10	Common Cathode, Digit 4	22	Anode G, Digit 1,2,3,4
11	Anode E, Digit 2,3,4	23	Anode L1
12	Anode D.P.2	24	Cathode L1, L2, L3

B. LTC-3718 Series

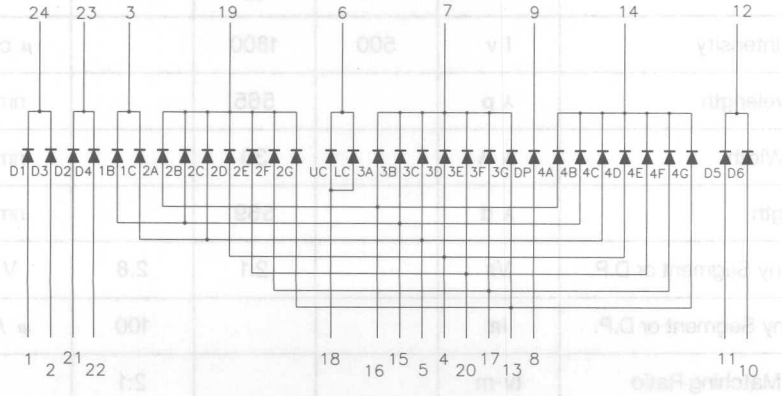
Pin No.	Connection	Pin No.	Connection
1	Anode D1	13	Anode G
2	Anode D3	14	Common Cathode Digit 4
3	Common Cathode Digit 1	15	Anode B
4	Anode D	16	Anode A
5	Anode 3	17	Anode F
6	Cathode UC, LC	18	Anode UC, LC
7	Common Cathode, Digit 3	19	Common Cathode Digit 2
8	Anode D.P.	20	Anode E
9	Cathode D.P.	21	Anode D2
10	Anode D6	22	Anode 4
11	Anode D5	23	Cathode D2, D4
12	Cathode D5, D6	24	Cathode D1, D3

Internal Circuit Diagrams

A. LTC-3710 Series



B. LTC-3718 Series



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation Per Segment	40	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	60	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	15 0.20	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	V
Operating Temperature Range	-35 ℃ to + 85 ℃		
Storage Temperature Range	-35 ℃ to + 85 ℃		
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260 ℃			

Electrical/Optical Characteristics at Ta=25 ℃

LTC-3710P/3718P

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	200	600		μ cd	IF=10mA
Peak Emission Wavelength	λ p		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

LTC-3710G/3718G

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	500	1800		μ cd	IF=10mA
Peak Emission Wavelength	λ p		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

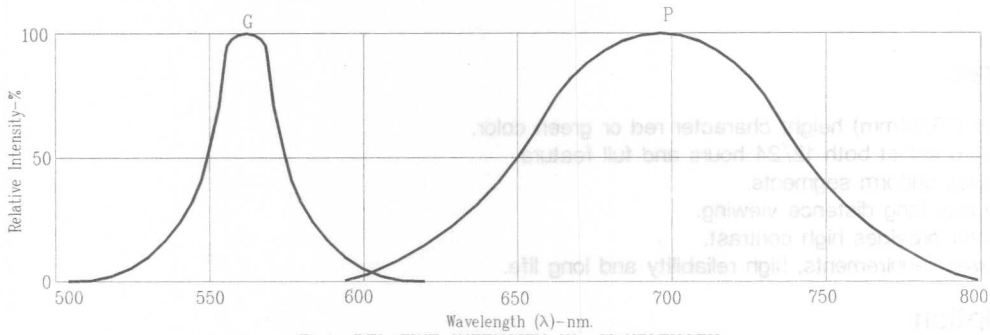


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

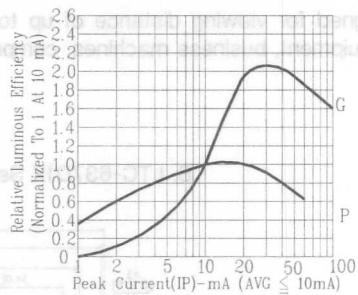


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

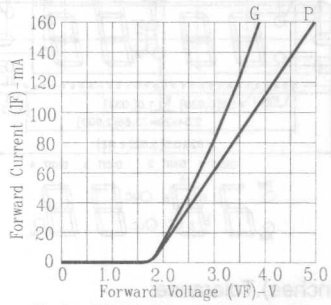


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

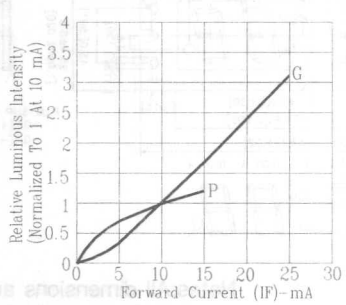


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

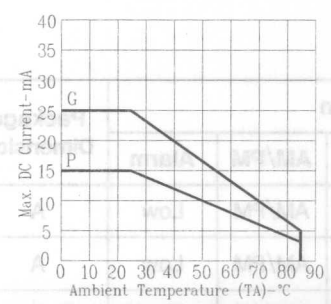


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

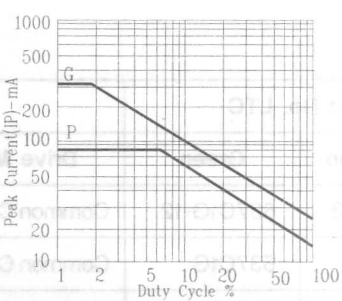


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: P=BRIGHT RED G=GREEN (REFRESH RATE 1KHz)

CLOCK LED DISPLAYS

LITEON 0.6" Four Digit Clock LED Displays

LTC-637 Series

Features

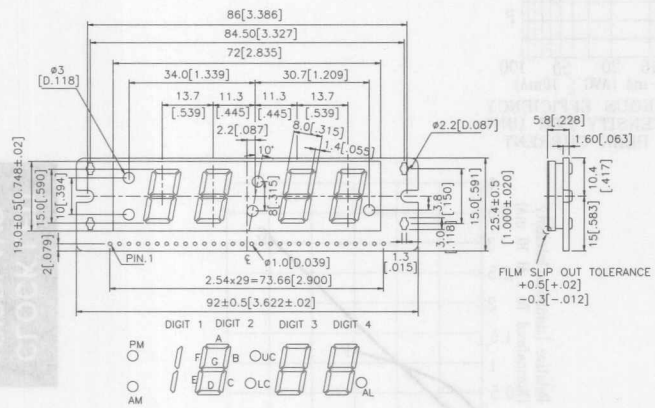
- 0.6 inch (15.24mm) height character red or green color.
- Flexible to select both 12/24 hours and full feature.
- Continuous uniform segments.
- Wide angle, long distance viewing.
- Color filter provides high contrast.
- Low power requirements, high reliability and long life.

Description

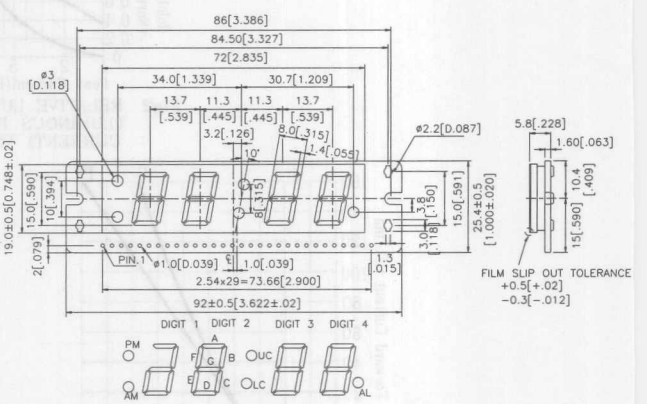
The LTC-6000 series devices are designed for viewing distance of up to two meters and for using in instrument, test equipment, communication equipment, business machines, computers, micro processor...ect.

Package Dimensions

A. LTC-637C1X Series



B. LTC-637D1X Series



Notes:All dimensions are in millimeters (inches).Tolerance:
± 0.25mm (0.010") unless otherwise noted.

Devices

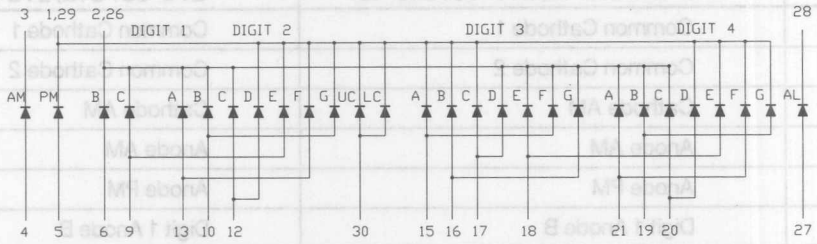
Part No. LTC-		Description				Package Dimension	Internal Circuit Diagram
Bright Red	Green	Drive Mode	Clock	AM/PM	Alarm		
637C1P-12	637C1G-12	Common Cathode	12Hr	AM/PM	Low	A	A
637C1P	637C1G	Common Cathode	24Hr	AM/PM	Low	A	B
637D1P-12	637D1G-12	Common Cathode	12Hr	AM/PM	Low	B	A
637D1P	637D1G	Common Cathode	24Hr	AM/PM	Low	B	B

Pin Connection

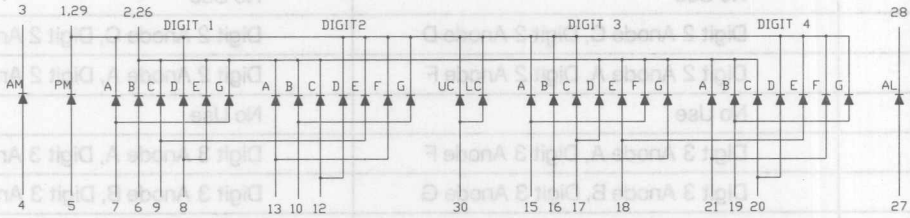
Pin No.	LTC-637C1P-12/LTC-637D1P-12 LTC-637C1G-12/LTC-637D1G-12	LTC-637C1P/LTC-637D1P LTC-637C1G/LTC-637D1G
1	Common Cathode 1	Common Cathode 1
2	Common Cathode 2	Common Cathode 2
3	Cathode AM	Cathode AM
4	Anode AM	Anode AM
5	Anode PM	Anode PM
6	Digit 1 Anode B	Digit 1 Anode B
7	No Use	Digit 1 Anode A, Digit 1 Anode G
8	No Use	Digit 1 Anode D, Digit 1 Anode E
9	Digit 2 Anode E, Digit 1 Anode C	Digit 2 Anode E, Digit 1 Anode C
10	Digit 2 Anode B, Digit 2 Anode G	Digit 2 Anode B, Digit 2 Anode G
11	No Use	No Use
12	Digit 2 Anode C, Digit 2 Anode D	Digit 2 Anode C, Digit 2 Anode D
13	Digit 2 Anode A, Digit 2 Anode F	Digit 2 Anode A, Digit 2 Anode F
14	No Use	No Use
15	Digit 3 Anode A, Digit 3 Anode F	Digit 3 Anode A, Digit 3 Anode F
16	Digit 3 Anode B, Digit 3 Anode G	Digit 3 Anode B, Digit 3 Anode G
17	Digit 3 Anode C, Digit 3 Anode D	Digit 3 Anode C, Digit 3 Anode D
18	Digit 3 Anode E, Digit 4 Anode E	Digit 3 Anode E, Digit 4 Anode E
19	Digit 4 Anode B, Digit 4 Anode G	Digit 4 Anode B, Digit 4 Anode G
20	Digit 4 Anode C, Digit 4 Anode D	Digit 4 Anode C, Digit 4 Anode D
21	Digit 4 Anode A, Digit 4 Anode F	Digit 4 Anode A, Digit 4 Anode F
22	No Connection	No Connection
23	No Connection	No Connection
24	No Connection	No Connection
25	No Connection	No Connection
26	Common Cathode 2	Common Cathode 2
27	Anode AL	Anode AL
28	Cathode AL	Cathode AL
29	Common Cathode 1	Common Cathode 1
30	Anode UC, Anode LC	Anode UC, Anode LC

Internal Circuit Diagrams

A. LTC-637C1P-12/637D1P-12/637C1G-12/637D1G-12



B. LTC-637C1P/637D1P/637C1G/637D1G



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation Per Segment	40	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	60	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	15 0.20	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	V
Operating Temperature Range	-25 ℃ to + 65 ℃		
Storage Temperature Range	-25 ℃ to + 65 ℃		
Max. Solder Temperature 260 ℃ from 3 Seconds at 2 mm from The Case or Reflector Edge			

Electrical/Optical Characteristics at Ta=25 ℃

Bright Red

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	Iv	125	350		μ cd	IF=10mA
Peak Emission Wavelength	λ p		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	200	600		μ cd	IF=10mA
Peak Emission Wavelength	λ p		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

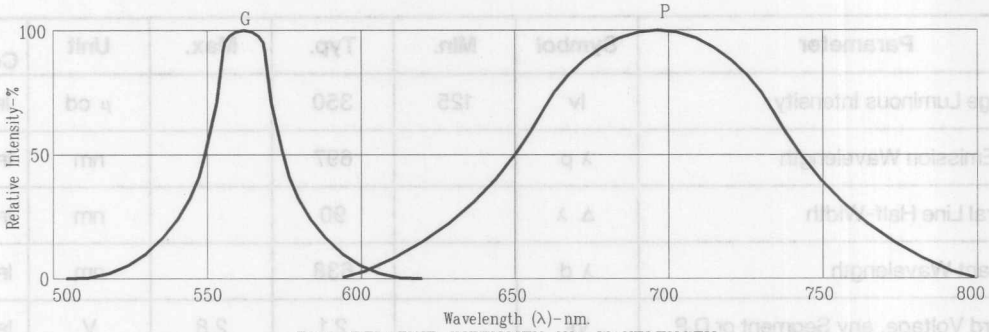


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

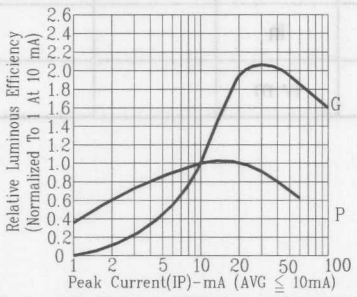


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

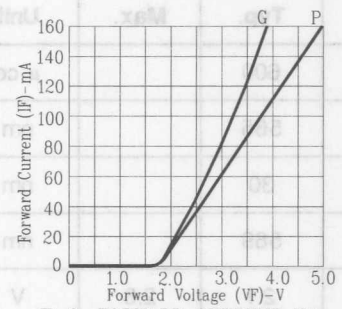


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

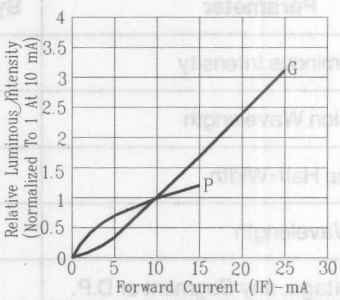


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

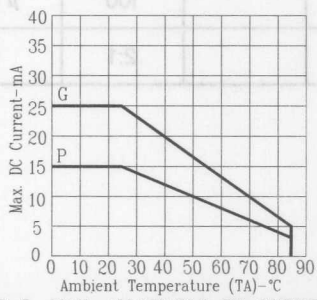


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

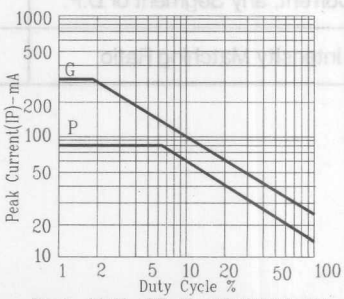


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: P=BRIGHT RED G=GREEN (REFRESH RATE 1KHz)

LITEON 0.6" Four Digit Clock LED Displays

LTC-6512 Series

Features

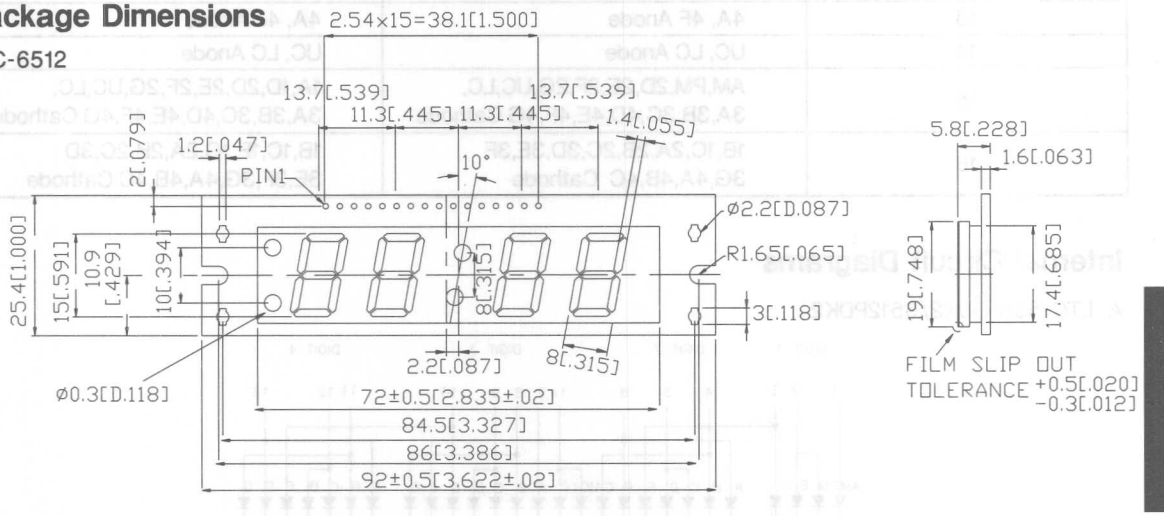
- 0.6 inch (15.24mm) height character red or green color.
- Flexible to select both 12/24 hours and full feature.
- Continuous uniform segments.
- Wide angle, long distance viewing.
- Color filter provides high contrast.
- Low power requirements, high reliability and long life.

Description

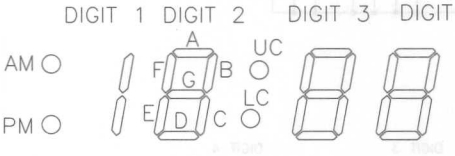
The LTC-6000 series devices are designed for viewing distance of up to two meters and for using in instrument, test equipment, communication equipment, business machines, computers, micro processor...ect.

Package Dimensions

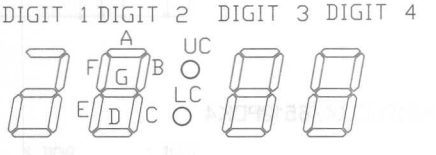
LTC-6512



A. LTC-6512GDK2/6512PDK2



B. LTC-6512GDK4/6512PDK4



Notes:All dimensions are in millimeters (inches).Tolerance:
± 0.25mm (0.010") unless otherwise noted.

Devices

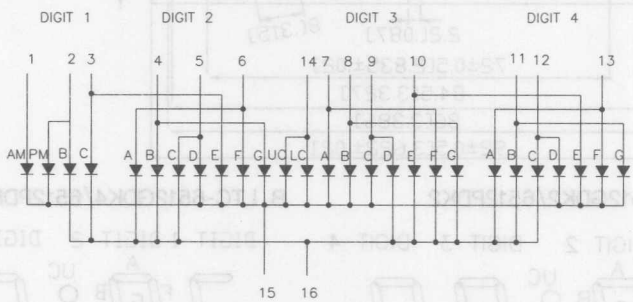
Part No. LTC-		Description				Internal Circuit Diagram
Bright Red	Green	Drive Mode	Clock	AM/PM	Alarm	
6512PDK2	6512GDK2	Common Cathode	12Hr	AM/PM	-	A
6512PDK4	6512GDK4	Common Cathode	24Hr	-	-	B

Pin Connection

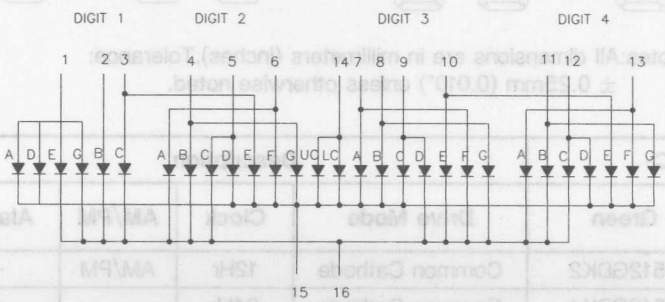
Pin No.	Connection	
	LTC-6512GDK2/6512PDK2	LTC-6512GDK4/6512PDK4
1	AM Anode	1A, 1D, 1E, 1G Anode
2	PM, 1B Anode	1B Anode
3	1C, 2E Anode	1C, 2E Anode
4	2B, 2G Anode	2B, 2G Anode
5	2C, 2D Anode	2C, 2D Anode
6	2A, 2F Anode	2A, 2F Anode
7	3A, 3F Anode	3A, 3F Anode
8	3B, 3G Anode	3B, 3G Anode
9	3C, 3D Anode	3C, 3D Anode
10	3E, 4E Anode	3E, 4E Anode
11	4B, 4G Anode	4B, 4G Anode
12	4C, 4D Anode	4C, 4D Anode
13	4A, 4F Anode	4A, 4F Anode
14	UC, LC Anode	UC, LC Anode
15	AM,PM,2D,2E,2F,2G,UC,LC, 3A,3B,3C,4D,4E,4F,4G Cathode	1A,1D,2D,2E,2F,2G,UC,LC, 3A,3B,3C,4D,4E,4F,4G Cathode
16	1B,1C,2A,2B,2C,3D,3E,3F 3G,4A,4B,4C Cathode	1B,1C,1E,1G,2A,2B,2C,3D 3E,3F,3G,4A,4B,4C Cathode

Internal Circuit Diagrams

A. LTC-6512GDK2/6512PDK2



B. LTC-6512GDK4/6512PDK4



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation Per Segment	40	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	60	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	15 0.20	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	V
Operating Temperature Range	-25 ℃ to + 65 ℃		
Storage Temperature Range	-25 ℃ to + 65 ℃		
Max. Solder Temperature 260 ℃ from 3 Seconds at 2 mm from The Case or Reflector Edge			

Electrical/Optical Characteristics at Ta=25 ℃
Bright Red

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	125	350		μ cd	I_F=10mA
Peak Emission Wavelength	λ p		697		nm	I_F=20mA
Spectral Line Half-Width	Δ λ		90		nm	I_F=20mA
Dominant Wavelength	λ d		638		nm	I_F=20mA
Forward Voltage, any Segment or D.P.	V_F		2:1	2.8	V	I_F=20mA
Reverse Current, any Segment or D.P.	I_R			100	μ A	V_R=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F=10mA

Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	200	600		μ cd	I_F=10mA
Peak Emission Wavelength	λ p		565		nm	I_F=20mA
Spectral Line Half-Width	Δ λ		30		nm	I_F=20mA
Dominant Wavelength	λ d		569		nm	I_F=20mA
Forward Voltage, any Segment or D.P.	V_F		2.1	2.8	V	I_F=20mA
Reverse Current, any Segment or D.P.	I_R			100	μ A	V_R=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

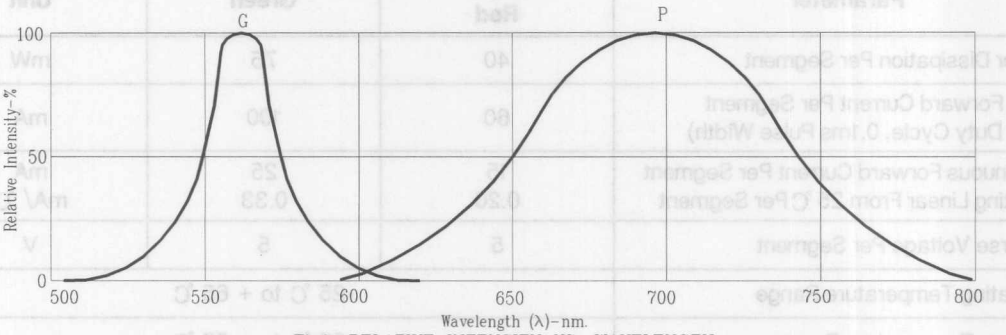


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

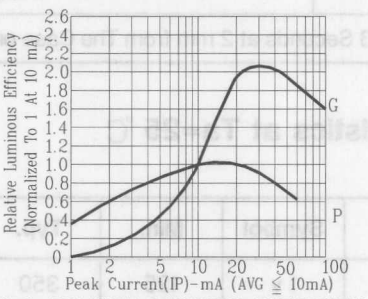


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

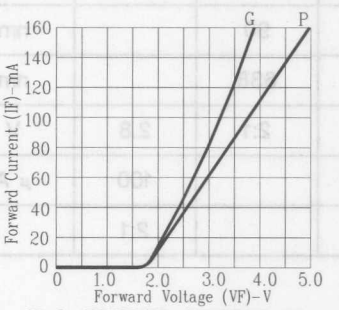


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

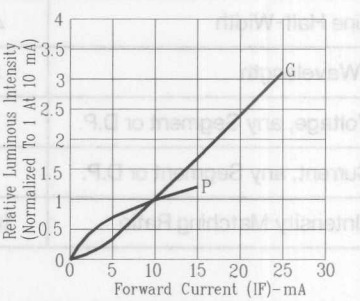


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

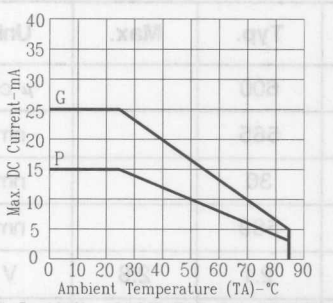


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

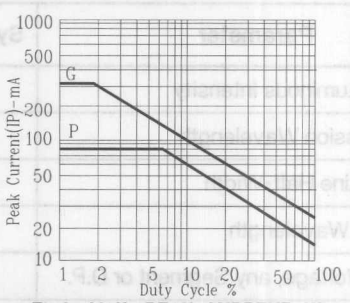


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: P=BRIGHT RED G=GREEN (REFRESH RATE 1KHz)

0.9" Four Digit Clock LED Displays

LTC-9000 Series

Features

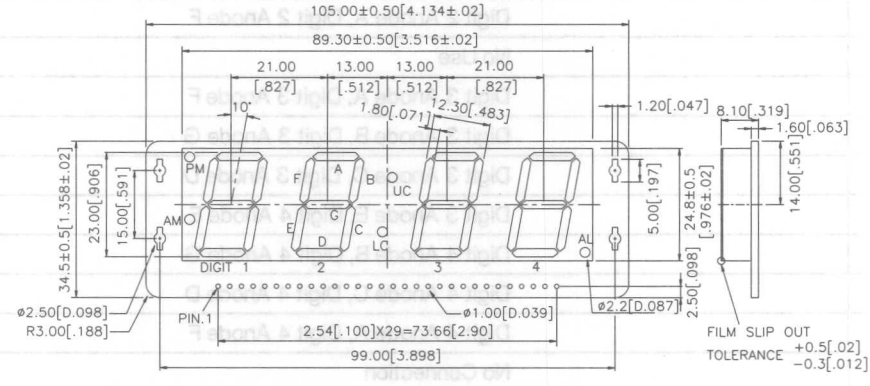
- 0.9 inch (22.86mm) height character red or green color.
- Flexible to select both 12/24 hours and full feature.
- Continuous uniform segments.
- Wide angle, long distance viewing.
- Color filter provides high contrast.
- Low power requirements, high reliability and long life.

Description

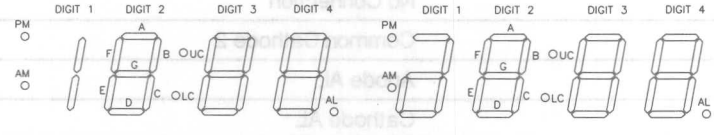
The LTC-9000 series devices are designed for viewing distance of up to two meters and for using in instrument, test equipment, communication equipment, business machines, computers, micro processor...ect.

Package Dimensions

LTC-937



A.LTC-937S1P-12/937S1G-12 B. LTC-937S1P/937S1G



Notes:All dimensions are in millimeters (inches). Tolerance : ± 0.25mm (0.010") unless otherwise noted.

Devices

Part No. LTC-		Description				Internal Circuit Diagram
Bright Red	Green	Drive Mode	Clock	AM/PM	Alarm	
937S1P-12	937S1G-12	Common Cathode	12Hr	AM/PM	Low	A
937S1P	937S1G	Common Cathode	24Hr	AM/PM	Low	B

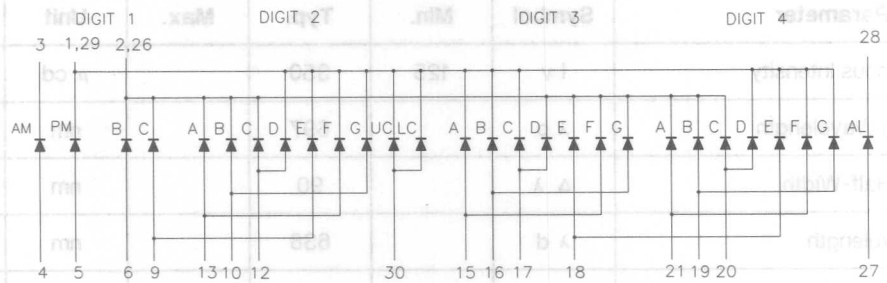
Pin connection

Pin No.	Connection
1	Common Cathode 1
2	Common Cathode 2
3	Cathode AM
4	Anode AM
5	Anode PM
6	Digit 1 Anode B
7	Digit 1 Anode A, Digit 1 Anode G
8	Digit 1 Anode D, Digit 1 Anode E
9	Digit 2 Anode E, Digit 1 Anode C
10	Digit 2 Anode B, Digit 2 Anode G
11	No Use
12	Digit 2 Anode C, Digit 2 Anode D
13	Digit 2 Anode A, Digit 2 Anode F
14	No Use
15	Digit 3 Anode A, Digit 3 Anode F
16	Digit 3 Anode B, Digit 3 Anode G
17	Digit 3 Anode C, Digit 3 Anode D
18	Digit 3 Anode E, Digit 4 Anode E
19	Digit 4 Anode B, Digit 4 Anode G
20	Digit 4 Anode C, Digit 4 Anode D
21	Digit 4 Anode A, Digit 4 Anode F
22	No Connection
23	No Connection
24	No Connection
25	No Connection
26	Common Cathode 2
27	Anode AL
28	Cathode AL
29	Common Cathode 1
30	Anode UC, Anode LC

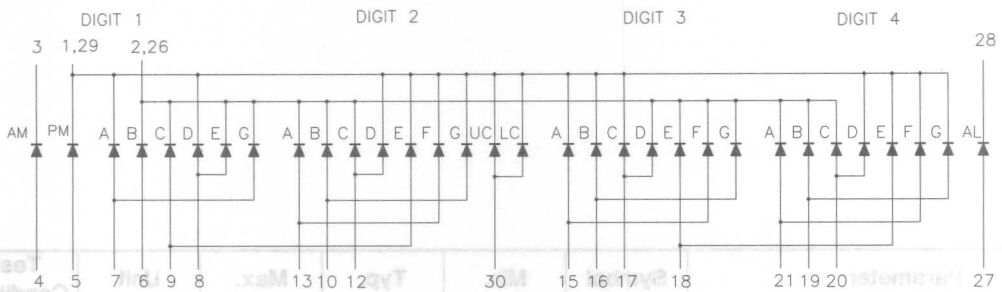
Note : Pin no. 7 & 8 are no connection for "12 hrs" devices.

Internal Circuit Diagrams

A. LTC-937S1P-12/937S1G-12



B. LTC-937S1P/937S1G



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation Per Segment	40	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	60	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	15 0.20	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	5	5	V
Operating Temperature Range	-25 ℃ to + 65 ℃		
Storage Temperature Range	-25 ℃ to + 65 ℃		
Max. Solder Temperature 260 ℃ from 3 Seconds at 2 mm from The Case or Reflector Edge			

Electrical/Optical Characteristics at Ta=25 ℃

Bright Red

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	125	350		μ cd	IF=10mA
Peak Emission Wavelength	λ p		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	200	600		μ cd	IF=10mA
Peak Emission Wavelength	λ p		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

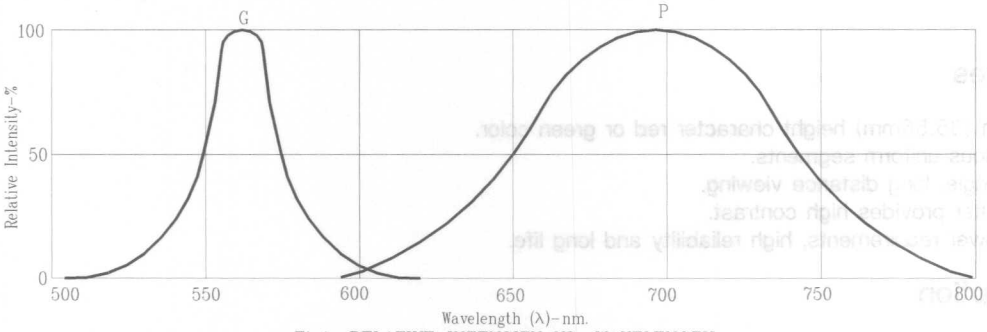


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

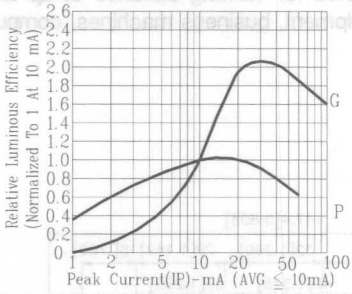


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

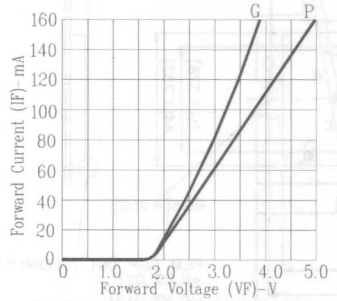


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

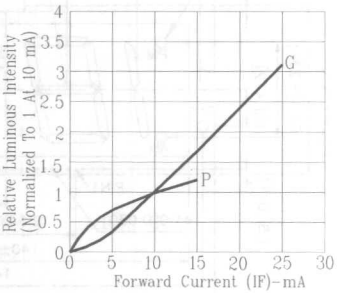


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

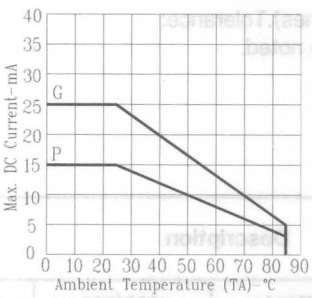


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

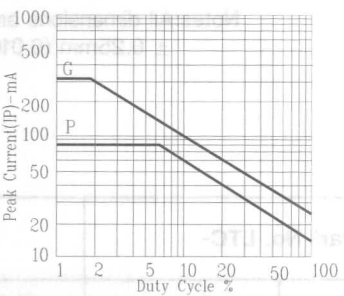


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: P=BRIGHT RED G=GREEN (REFRESH RATE 1KHz)

CLOCK LED DISPLAYS

LITEON 1.4" Four Digit Clock LED Displays

LTC-14000 Series

Features

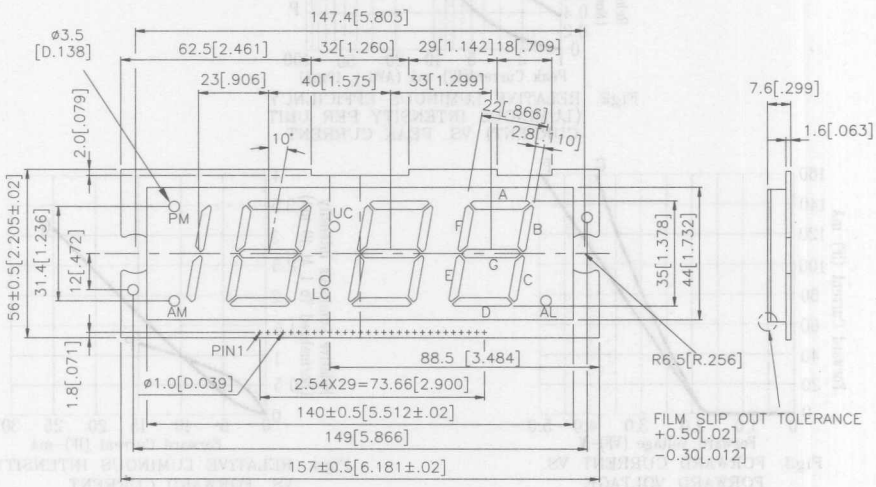
- 1.4 inch (35.56mm) height character red or green color.
- Continuous uniform segments.
- Wide angle, long distance viewing.
- Color filter provides high contrast.
- Low power requirements, high reliability and long life.

Description

The LTC-14000 series devices are designed for viewing distance of up to two meters and for using in instrument, test equipment, communication equipment, business machines, computers,micro processor...ect.

Package Dimensions

LTC-14501



Notes:All dimensions are in millimeters (inches).Tolerance:
± 0.25mm (0.010") unless otherwise noted.

Devices

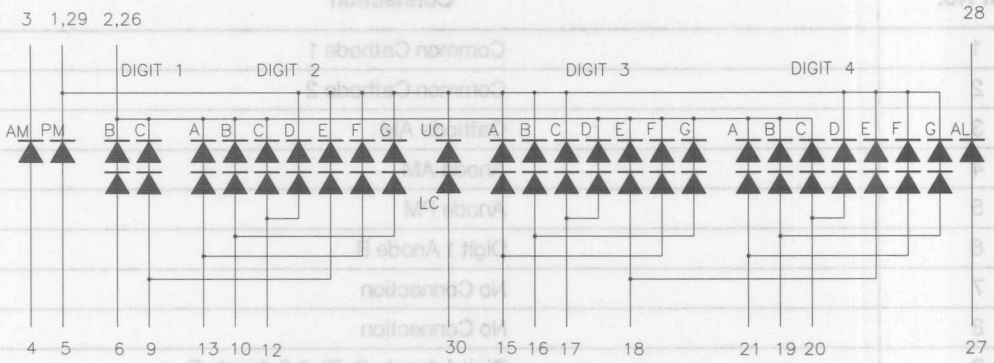
Part No. LTC-		Description			
Bright Red	**Green**	**Drive Mode**	**Clock**	**AM/PM**	**Alarm**
14501A1P-2	14501A1G-2	Common Cathode	12Hr	AM/PM	Low

Pin connection

Pin No.	Connection
1	Common Cathode 1
2	Common Cathode 2
3	Cathode AM
4	Anode AM
5	Anode PM
6	Digit 1 Anode B
7	No Connection
8	No Connection
9	Digit 1 Anode C, Digit 2 Anode E
10	Digit 2 Anode B, Digit 2 Anode G
11	No Connection
12	Digit 2 Anode C, Digit 2 Anode D
13	Digit 2 Anode A, Digit 2 Anode F
14	No Connection
15	Digit 3 Anode A, Digit 3 Anode F
16	Digit 3 Anode B, Digit 3 Anode G
17	Digit 3 Anode C, Digit 3 Anode D
18	Digit 3 Anode E, Digit 4 Anode E
19	Digit 4 Anode B, Digit 4 Anode G
20	Digit 4 Anode C, Digit 4 Anode D
21	Digit 4 Anode A, Digit 4 Anode F
22	No Connection
23	No Connection
24	No Connection
25	No Connection
26	Common Cathode 2
27	Anode AL
28	Cathode AL
29	Common Cathode 1
30	Anode UC, Anode LC

Internal Circuit Diagram

LTC-14501



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation Per Segment (Dot)	80(40)	120(75)	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	60	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	15 0.20	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment (Dot)	10(5)	10(5)	V
Operating Temperature Range	-25 ℃ to + 65 ℃		
Storage Temperature Range	-25 ℃ to + 65 ℃		
Max. Solder Temperature 260 ℃ from 3 Seconds at 2 mm from The Case or Reflector Edge			

Electrical/Optical Characteristics at Ta=25 ℃
Bright Red

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	200	600		μ cd	IF=10mA
Peak Emission Wavelength	λ p		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, any Segment or D.P. (Dot)	VF		4.2(2.1)	5.6(2.8)	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	500	1100		μ cd	IF=10mA
Peak Emission Wavelength	λ p		565		nm	IF=20mA
Spectral Line Half-Width	Δ λ		30		nm	IF=20mA
Dominant Wavelength	λ d		569		nm	IF=20mA
Forward Voltage, any Segment or D.P. (Dot)	VF		4.2(2.1)	5.6(2.8)	V	IF=20mA
Reverse Current, any Segment or D.P.	IR			100	μ A	VR=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

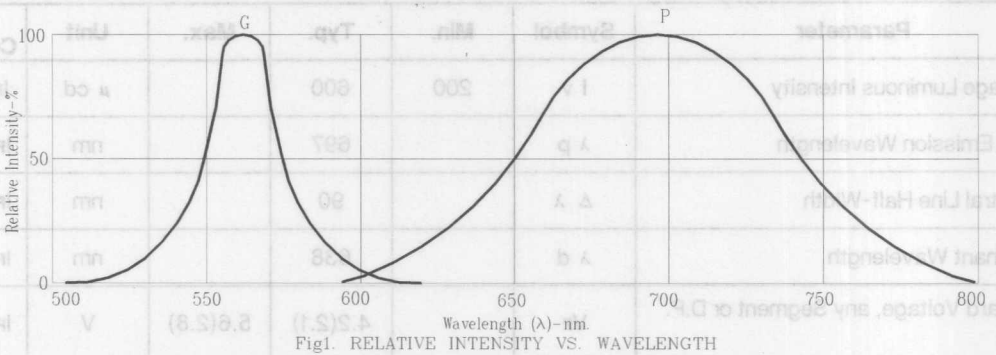


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

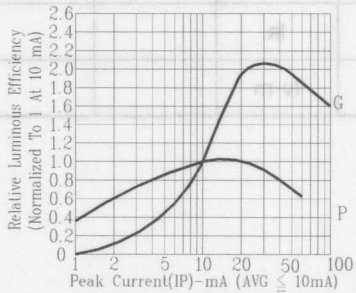


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

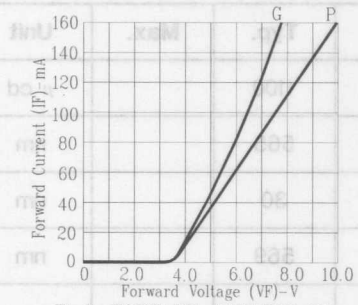


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

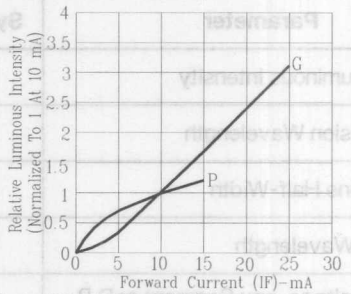


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

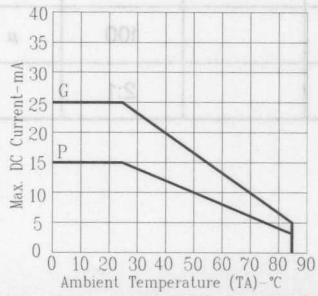


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

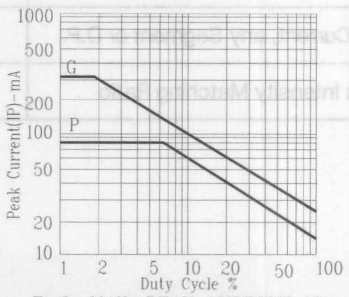


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: P=BRIGHT RED G=GREEN (REFRESH RATE 1KHz)

1.8" Four Digit Clock LED Displays

LTC-18000 Series

Features

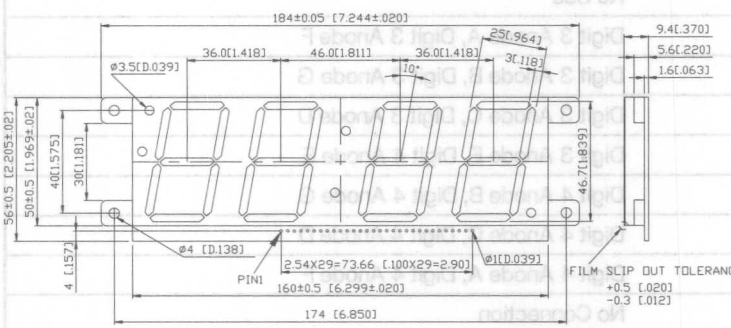
- 1.8 inch (45.72mm) height character red or green color.
- Flexible to select both 12/24 hours and full feature.
- Continuous uniform segments.
- Wide angle, long distance viewing.
- Color filter provides high contrast.
- Low power requirements, high reliability and long life.

Description

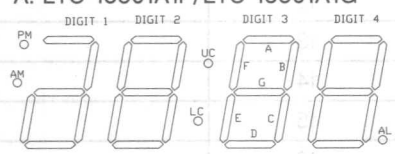
The LTC-18000 series devices are designed for viewing distance of up to two meters and for using in instrument, test equipment, communication equipment, business machines, computers, micro processor...ect.

Package Dimensions

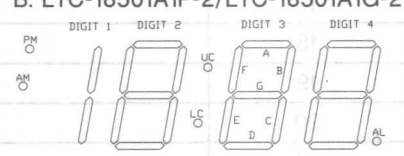
LTC-18501



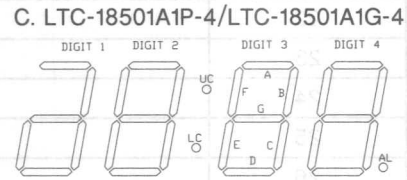
A. LTC-18501A1P/LTC-18501A1G



B. LTC-18501A1P-2/LTC-18501A1G-2



C. LTC-18501A1P-4/LTC-18501A1G-4



Notes:All dimensions are in millimeters (inches).Tolerance:
± 0.25mm (0.010") unless otherwise noted.

Devices

Part No. LTC-		Description			Internal Circuit Diagram
Bright Red	Green	Drive Mode	Clock	AM/PM	
18501A1P	18501A1G	Common Cathode	24Hr	AM/PM	A
18501A1P-2	18501A1G-2	Common Cathode	12Hr	AM/PM	B
18501A1P-4	18501A1G-4	Common Cathode	24Hr	-	C

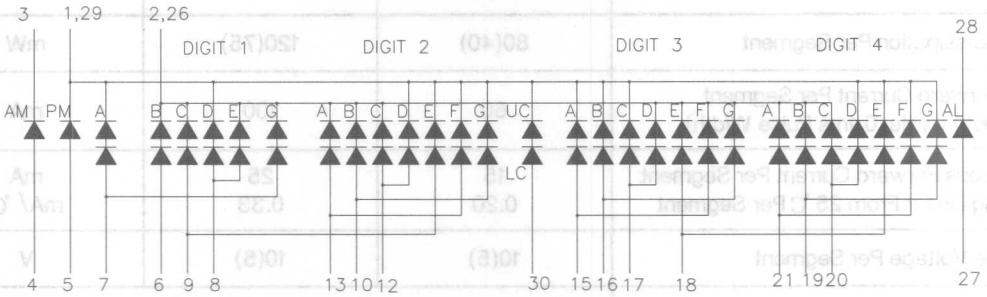
Pin connection

Pin No.	Connection
1	Common Cathode 1
2	Common Cathode 2
3	Cathode AM
4	Anode AM
5	Anode PM
6	Digit 1 Anode B
7	Digit 1 Anode A, Digit 1 Anode G
8	Digit 1 Anode D, Digit 1 Anode E
9	Digit 2 Anode E, Digit 1 Anode C
10	Digit 2 Anode B, Digit 2 Anode G
11	No Use
12	Digit 2 Anode C, Digit 2 Anode D
13	Digit 2 Anode A, Digit 2 Anode F
14	No Use
15	Digit 3 Anode A, Digit 3 Anode F
16	Digit 3 Anode B, Digit 3 Anode G
17	Digit 3 Anode C, Digit 3 Anode D
18	Digit 3 Anode E, Digit 4 Anode E
19	Digit 4 Anode B, Digit 4 Anode G
20	Digit 4 Anode C, Digit 4 Anode D
21	Digit 4 Anode A, Digit 4 Anode F
22	No Connection
23	No Connection
24	No Connection
25	No Connection
26	Common Cathode 2
27	Anode AL
28	Cathode AL
29	Common Cathode 1
30	Anode UC, Anode LC

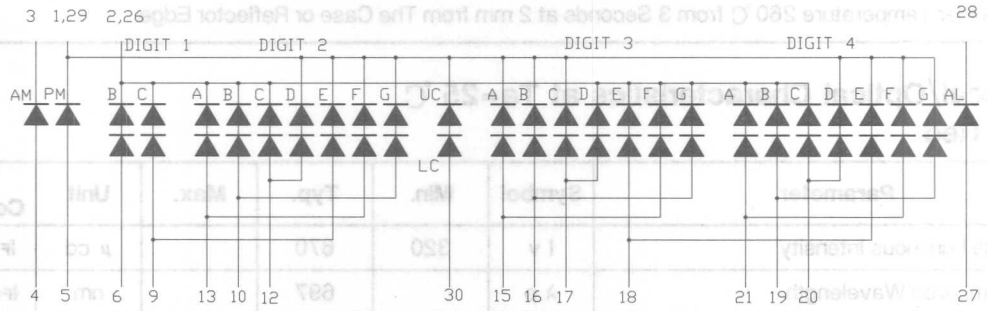
NOTE : Pin no. 7 & 8 are no connection for "LTC-18501A1P-2 or LTC-18501A1G-2" devices.
Pin no. 3 & 4 & 5 are no connection for "LTC-18501A1P-4 or LTC-18501A1G-4" devices.

Internal Circuit Diagrams

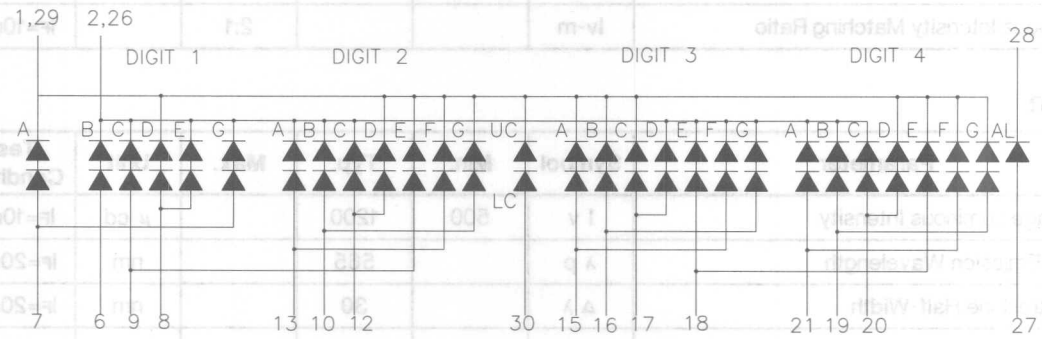
A. LTC-18501A1P/LTC-18501A1G



B. LTC-18501A1P-2/LTC-18501A1G-2



C. LTC-18501A1P-4/LTC-18501A1G-4



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Green	Unit
Power Dissipation Per Segment	80(40)	120(75)	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	60	100	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	15 0.20	25 0.33	mA mA/ ℃
Reverse Voltage Per Segment	10(5)	10(5)	V
Operating Temperature Range	-25 ℃ to + 65 ℃		
Storage Temperature Range	-25 ℃ to + 65 ℃		
Max. Solder Temperature 260 ℃ from 3 Seconds at 2 mm from The Case or Reflector Edge			

Electrical/Optical Characteristics at Ta=25 ℃

Bright Red

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	320	670		μ cd	I_F=10mA
Peak Emission Wavelength	λ p		697		nm	I_F=20mA
Spectral Line Half-Width	Δ λ		90		nm	I_F=20mA
Dominant Wavelength	λ d		638		nm	I_F=20mA
Forward Voltage, any Segment or D.P. (Dot)	V_F		4.2(2.1)	5.6(2.8)	V	I_F=20mA
Reverse Current, any Segment or D.P.	I_R			100	μ A	V_R=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F=10mA

Green

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	500	1200		μ cd	I_F=10mA
Peak Emission Wavelength	λ p		565		nm	I_F=20mA
Spectral Line Half-Width	Δ λ		30		nm	I_F=20mA
Dominant Wavelength	λ d		569		nm	I_F=20mA
Forward Voltage, any Segment or D.P. (Dot)	V_F		4.2(2.1)	5.6(2.8)	V	I_F=20mA
Reverse Current, any Segment or D.P.	I_R			100	μ A	V_R=10V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F=10mA

Typical electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

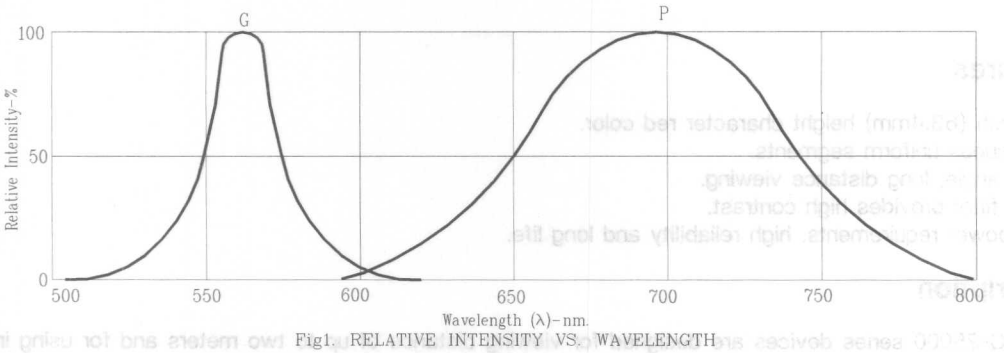


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

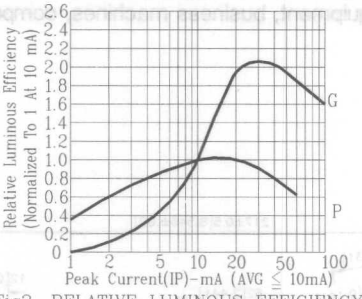


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

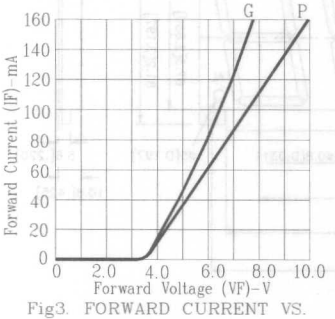


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

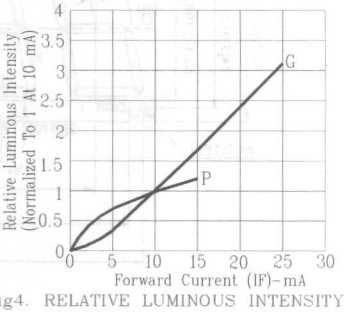


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

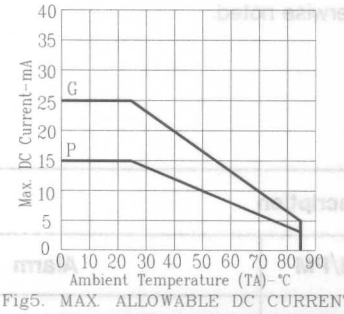


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

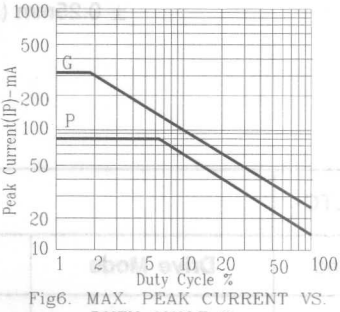


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: P=BRIGHT RED G=GREEN (REFRESH RATE 1KHz)

CLOCK LED DISPLAYS

LITEON 2.5" Four Digit Clock LED Displays

LTC-25000 Series

Features

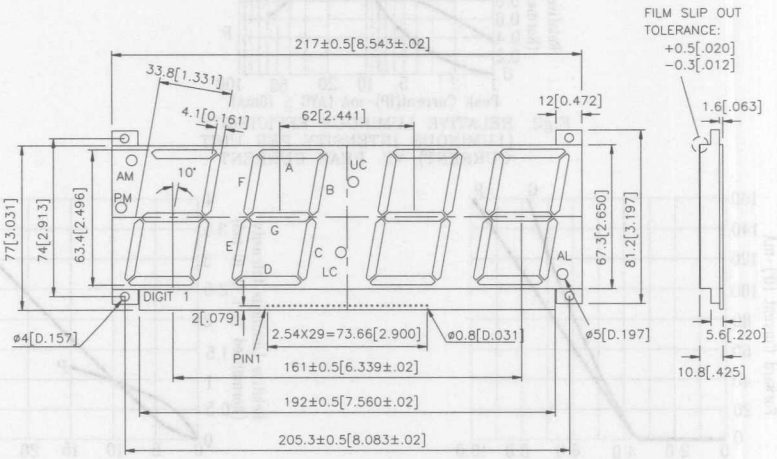
- 2.5 inch (63.4mm) height character red color.
- Continuous uniform segments.
- Wide angle, long distance viewing.
- Color filter provides high contrast.
- Low power requirements. high reliability and long life.

Description

The LTC-25000 series devices are designed for viewing distance of up to two meters and for using in instrument, test equipment, communication equipment, business machines, computers, micro processor...ect.

Package Dimensions

A. LTC-25501 series



Notes:All dimensions are in millimeters (inches).Tolerance:
± 0.25mm (0.010") unless otherwise noted.

Device

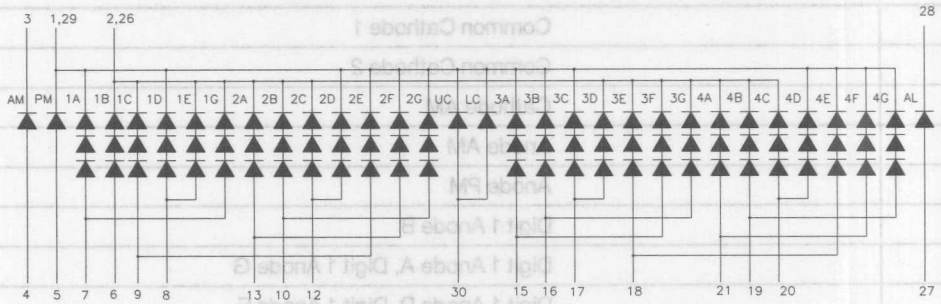
Part No. LTC-	Description			
Bright Red	Drive Mode	Clock	AM/PM	Alarm
25501PAA	Common Cathode	24Hr	AM/PM	Low

Pin Connection

Pin No.	Connection
1	Common Cathode 1
2	Common Cathode 2
3	Cathode AM
4	Anode AM
5	Anode PM
6	Digit 1 Anode B
7	Digit 1 Anode A, Digit 1 Anode G
8	Digit 1 Anode D, Digit 1 Anode E
9	Digit 2 Anode E, Digit 1 Anode C
10	Digit 2 Anode B, Digit 2 Anode G
11	No Use
12	Digit 2 Anode C, Digit 2 Anode D
13	Digit 2 Anode A, Digit 2 Anode F
14	No Use
15	Digit 3 Anode A, Digit 3 Anode F
16	Digit 3 Anode B, Digit 3 Anode G
17	Digit 3 Anode C, Digit 3 Anode D
18	Digit 3 Anode E, Digit 4 Anode E
19	Digit 4 Anode B, Digit 4 Anode G
20	Digit 4 Anode C, Digit 4 Anode D
21	Digit 4 Anode A, Digit 4 Anode F
22	No Connection
23	No Connection
24	No Connection
25	No Connection
26	Common Cathode 2
27	Anode AL
28	Cathode AL
29	Common Cathode 1
30	Anode UC, Anode LC

Internal Circuit Diagram

A. LTC-25501 series



Absolute Maximum Ratings at Ta=25 ℃

Parameter	Bright Red	Unit
Power Dissipation Per Segment (Dot)	110(40)	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	60	mA
Continuous Forward Current Per Segment Derating Linear From 25 ℃ Per Segment	15 0.20	mA mA/ ℃
Reverse Voltage Per Segment (Dot)	15(5)	V
Operating Temperature Range	-25 ℃ to + 65 ℃	
Storage Temperature Range	-25 ℃ to + 65 ℃	
Max. Solder Temperature 260 ℃ from 3 Seconds at 2 mm from The Case or Reflector Edge		

Electrical/Optical Characteristics at Ta=25 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I v	320	820		μ cd	IF=10mA
Peak Emission Wavelength	λ p		697		nm	IF=20mA
Spectral Line Half-Width	Δ λ		90		nm	IF=20mA
Dominant Wavelength	λ d		638		nm	IF=20mA
Forward Voltage, any Segment (Dot)	VF		6.3(2.1)	8.4(2.8)	V	IF=20mA
Reverse Current, any Segment (Dot)	IR			100	μ A	VR=15V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF=10mA

Typical Electrical/Optical Characteristic Curves (25 ℃ Ambient Temperature Unless Otherwise Noted)

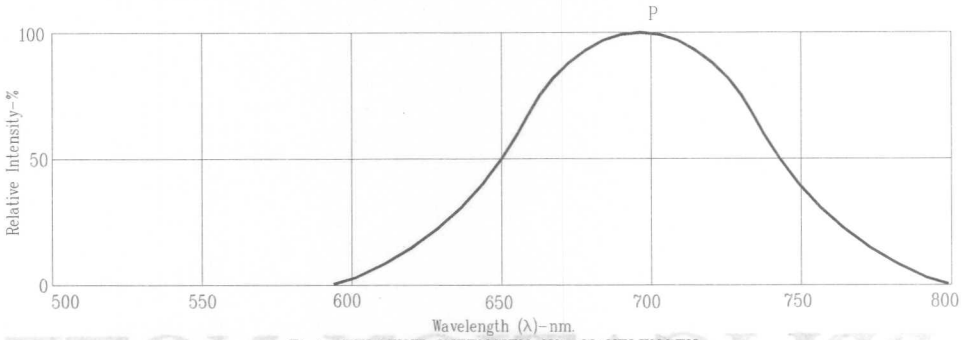


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

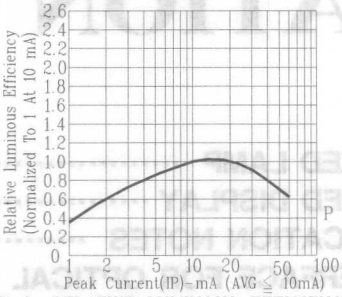


Fig2. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

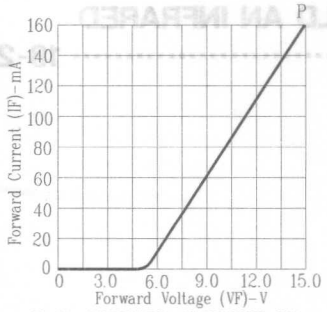


Fig3. FORWARD CURRENT VS. FORWARD VOLTAGE

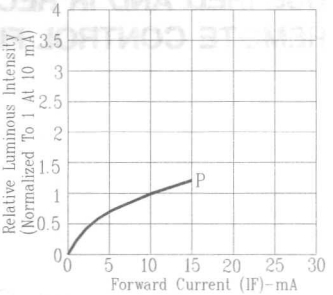


Fig4. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

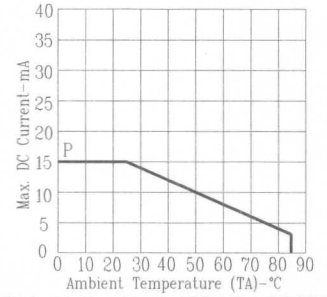


Fig5. MAX. ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

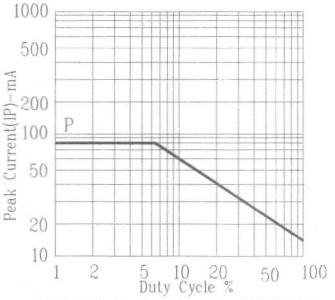


Fig6. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: P=BRIGHT RED (REFRESH RATE 1KHz)

APPLICATION NOTES

- HOW TO USE LITON LED LAMP 18-1
- HOW TO USE LITON LED DISPLAY 18-5
- SMD LED LAMP APPLICATION NOTES 18-7
- DIGITAL CIRCUIT INTERFACE FOR OPTICAL SWITCH 18-13
- OPTICAL SWITCH APPLICATION CIRCUIT COLLECTION 18-16
- USE IRED AND IR RECEIVER MODULE TO BUILD AN INFRARED REMOTE CONTROL FUNCTION 18-20

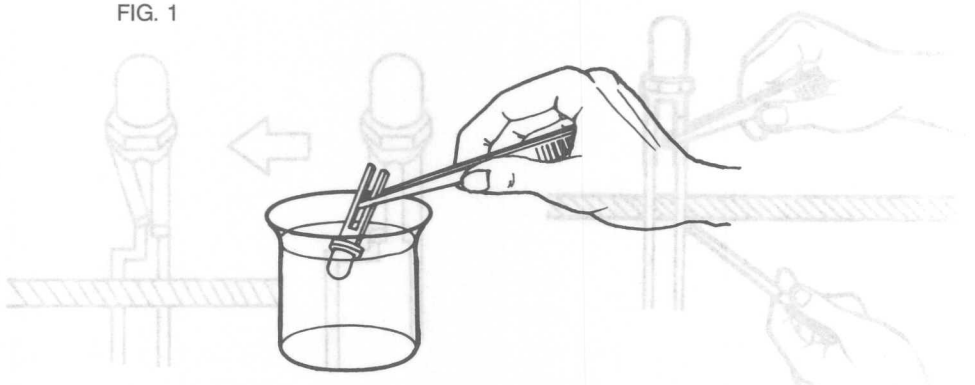
How To Use LITON LED Lamps

Generally, LITON LED Lamps can be used the same way as other general purpose semiconductors, however the following precautions must be taken to protect the LED.

1. Cleaning

Do not use unspecified chemical liquid to clean LED, they could harm the resin of the LED. If cleaning is necessary, immerse the LED in alcohol, freon TE or chlorosen at normal temperature for less than 1 minute. When other chemical solutions not specified are used, it may cause cracks or haze on the surface of the lens.

FIG. 1



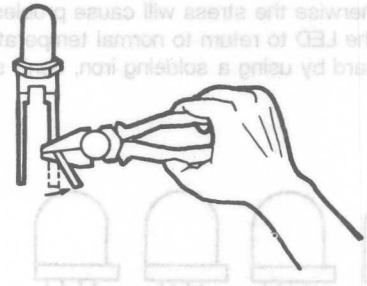
2. Forming

2.1 Do not form during or after soldering. If forming is required, it must be done before soldering.
2.2 Please keep in mind, any stress applied to resin can break gold wire in LED.
2.3 Form leads pin by securing under the tie bar cut (Fig. 2) and bending with radio pliers or the equivalent to avoid pressure on resin (Fig. 3).

FIG. 2

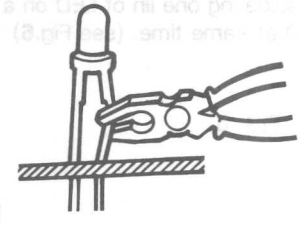


Tie bar cut



Secure lead pin

FIG. 3



Form before soldering

APPLICATION NOTES

How To Use LITON LED Lamps

3. Soldering

3.1 Solder under tie-bar cut as show in Fig.4. Hold pin leads, with tweezers during soldering, especially for smaller LED.

FIG. 4

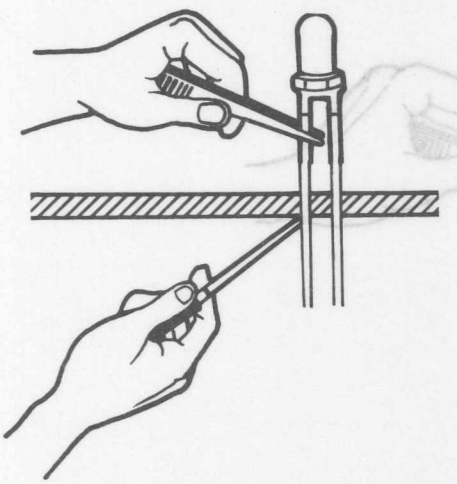
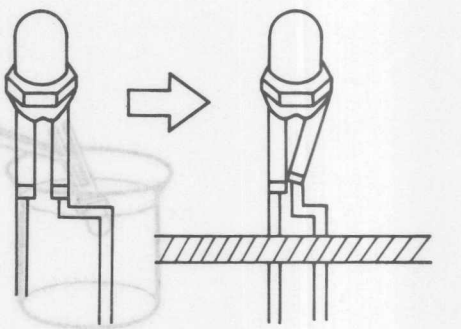


FIG. 5



If pitch of mounting holes is incorrect formed.
Pins will become distorted during insertion.

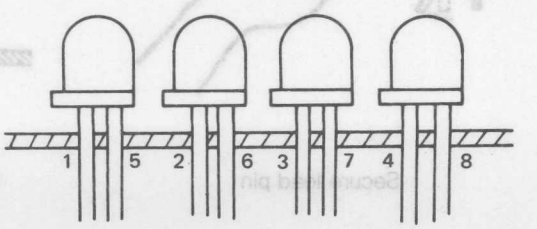
3.2 If stress is applied to LED while it is being on P.C. board Disconnection may occur during soldering or after mounting due to creep. Lead pin mounting holes must coincide with original or formed lead pin pitch to prevent stress.

3.3 Lead forming should be not added any stress to the LED body, to do so can fracture the device epoxy and possible break bond wires, which will cause failure.

3.4 When an LED is mounted into a P.C. board, pitch spacing should be carefully aligned so as not to cause any stress to the lead wires. Otherwise the stress will cause problems in high temperature operation. Three minutes are necessary for the LED to return to normal temperature after solder operation.

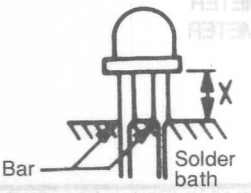
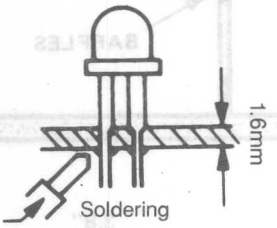
3.5 If soldering one lin of LED on a P.C. board by using a soldeing iron, don't solder both the leads of the LED at same time. (see Fig.6)

FIG. 6



How To Use LITON LED Lamps

3.6 The soldering iron should be operated at under 30w power consumption.
3.7 The LITON LED soldering specification is shown as below:

Method	Conditions	Temp	Time
Soldering bath method	Dip LED up to Xmm from resin 	230 ℃ ± 5	Within 5 Seconds
Soldering method	Soldering iron: 30W Tip: 4.5ϕx32mm Through hole P.C.B. 1.6mm thick 	Tip Temp 295 ℃ ± 5 ℃	Within 3 Seconds

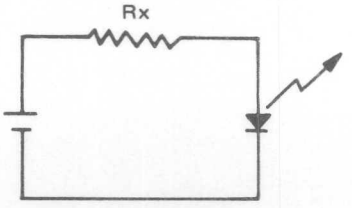
4. Preventing Overcurrent

4.1 Do not overcurrent.
4.2 In order to operate LITON LED under stable conditions, put protective resistors in series, Resistor Values can be determined by supply voltage or current for the LED. Recommended current for use is in the range of IF 10mA to 20mA. (fig.7)
4.3 Circuit must be designed so that overvoltage (overcurrent) is not applied to the LED during ON/OFF switching. Transients or pulse current can damage the junction of the LED die.

5. Brightness And Color

5.1 For obtain even brightness multiple LED should be kept at the same current.
5.2 To increase brightness, increase current.
5.3 It checked at a distance of 30cm from the LED to the eye detects.

FIG. 7



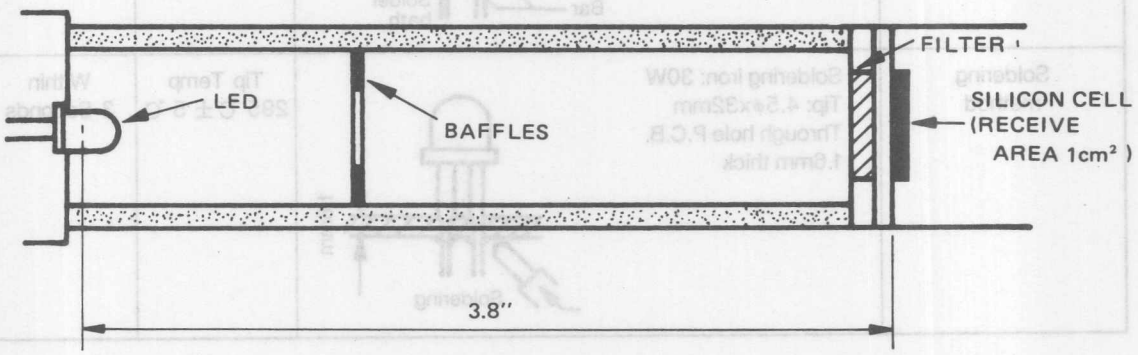
How To Use LITON LED Lamps

6. How To Test Luminous Intensity Of LITON LED Lamps

6.1 Standard luminous intensity tester:
EG & G MODEL 550-1 RADIOMETER/PHOTOMETER

6.2 Reference luminous intensity tester:
A. TEKTRONIX J16 PHOTOMETER
B. VIM MODEL 200 PHOTOMETER

6.3 Measurement hints



6.4 LED adapter
At one foot, one footcandle is equivalent to one candela.
At 3.8 inches, one footcandle is equivalent to 100 millicandelas.

How To Use LITON LED Displays

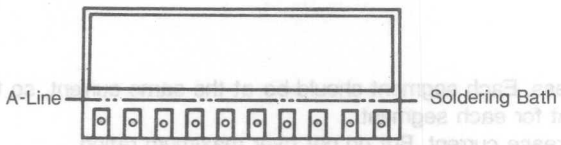
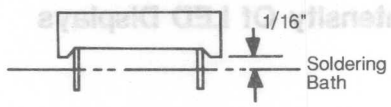
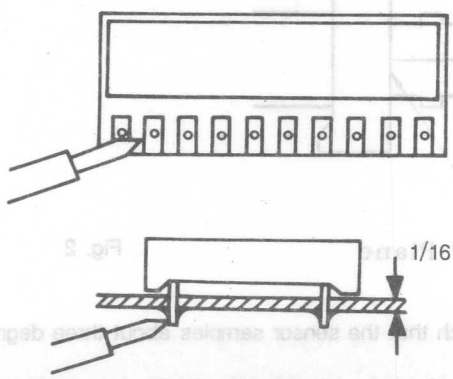
Generally, LITON LED displays can be used as same way as other general semiconductors. However the following precautions must be taken to protect the LED displays.

1. Cleaning

Do not use unspecified chemical liquids to clean display. They could harm the display. If cleaning is necessary, wipe the pin out with alcohol, freon TE or Chlorosen at normal temperature for less than 1 minute, or wipe the suface with alcohol. When other chemical solutions not specified are used. It may cause crack or haze on the surface of the display.

2. Soldering

2.1 The soldering iron should be operated under 40W power consumption.
2.2 The LITON LED displays soldering specification is shown as table 1.
2.3 The neutrality flux must be used before soldering.

Method	Conditions	Temp	Time
Soldering Bath Method	(1) Dip depth should under A-Line  A-Line is the middle between the edge of soldering pad and the edge of lite pipe. (2) Dip depth should under 1/16 inch below seating plane 	260 ℃ ± 5 ℃	Within 3 Seconds
Soldering Method	Soldering Iron: 40W Tip: 4.5ϕx32mm 	Tip Temp 205 ℃ ± 5 ℃	Within 3 Seconds

How To Use LITON LED Displays

3.Preventing Over Current

3.1 Do not overcurrent.

3.2 In order to operate LITON LED displays under stable conditions. Put protective resistors in series (Fig. 1) . Resistor values can be determined by supplying voltage or current for the led display. Recommednded current is in the range of forward current 5mA to 20mA.

3.3 circuit must be designed so that overvoltage (overcurrent) is not applied to the LED during ON/OFF switching. Transients or pules current will damage the junction of LED die.

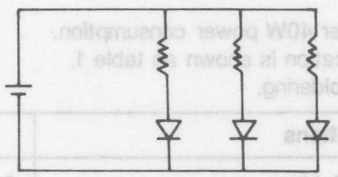


Fig. 1

4. Brightness And Color

4.1 For obtainning even brightness. Each segment should be at the same current, so the best circuit design is to supply constant current for each segment.

4.2 To increase brightness. Increase current. But do not over maximum rating.

4.3 To chkeck the appearance defdect of LED display, the viewing distance should be 30cm minimum.

4.4 Forobtainning more uniform brightness on yellow and green display. The supplying forward current should over 10mA, but do not over maximum rating.

5. How To Test Luminous Intensity Of LED Displays

5.1 Equipment: Tektronix

A. J17-PHOTOMETER

B. J1805 LED PROBE

5.2 Measurement Geometry

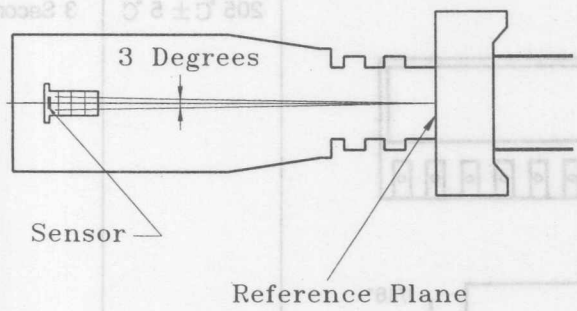


Fig. 2

5.3 LED probe and Adapter

The geometry of the J1805 is such that the sensor samples about three degrees from the center of the Led beam.

5.4 The average luminous intensity is obtain by summing the luminous intensity of each segment and dividing by the total number of segments. The numeric displays are categorized for luminous intensity with the intensity category designated by a letter located on the side of the package.

SMD LED Lamp application notes

General Information

A. Preface

In the design by using a LED Lamp, the objective is to achieve an optimum between light output, power dissipation, reliability and operating life. The " application consideration for SMD LED Lamps " can help to know the performance characteristics and capabilities of each LED Lamp so that an optimum design can be achieved.

B. Structure of an LED Lamp

Most SMD LED Lamps are manufactured by encapsulating an LED chip inside a plastic package. This configuration forms an immersion lens which enlarge the apparent size of the emitter. The magnification is a direct function of the index of refraction of the encapsulating material.

C. The Electrical & Optical Characteristics

The electrical and optical characteristics of an LED Lamp contain several parameters that quantitatively aid the designer in making this selection. These are forward voltage (V_F), reverse leakage current (I_R), light output (I_V),peak wavelength (λp), dominant wavelength (λd) and the included angle between half intensity points ($2\theta 1/2$).

i. Forward Voltage (V_F)

Basically, above 1.5 volts V_F, the current flowing through an LED increases very rapidly. The dynamic resistance can be considered to be the slope of the LED characteristic in forward region. Since the dynamic resistance is very small, LED Lamp should not be considered to connect in parallel. Small variations in V_F can cause current hogging by the LED Lamp with lowest V_F. This current hogging can cause variation in luminous intensity and excessive power dispassion.

ii. Reverse Leakage Current (I_R)

In general, exceeding breakdown voltage (BV_R) will not harm the LED Lamp as long as the reverse current is externally limited to prevent excessive power dissipation in the LED. Above the breakdown voltage (BV_R), the reverse current increases very rapidly. When several LED Lamps are connected in an array, reverse leakage current can cause unwanted ghosting of normally off LED. This can be prevented by using a driver with high impedance off state.

iii. Light Output (I_V)

Luminous intensity is a measurement of axial light output. The unit of measure is candle. Lite-On LED Lamps have been categorized for its light output. Each light output category have an $I_{V\ MAX}/ I_{V\ MIN}$ ratio of 2:1 or less than. A single array should be assembled with all LED lamps from the same category for even illuminated throughout the array.

iv. Peak Wavelength (λp)

Peak wavelength is that wavelength at the peak of the radiated spectrum. To the designer of a visual application, the total amount of LED Lamp emitted light passing through an optic filter, used for contrast enhancement, is approximately equal to the filter's relative transmission at peak wavelength. The relative transmission at peak wavelength is a quantitative of the optic density of a contrast filter.

v. Dominant Wavelength (λd)

Dominant wavelength is a quantitative measure of the color of an LED Lamp as perceived by the

eye. The parameter is particularly important to the designer if LED Lamps from various manufacturers might possibly be installed in the same array. Two devices of different radiate spectra will appear as the same color if they both have same dominant wavelength.

vi. Angle of Half Intensity ($2\theta 1/2$)

The parameter defines that included off-axial angle where the luminous intensity is equal to one half of the axial intensity. The importance of the radiation pattern to a designer is that it defines the apparent luminous intensity of the LED Lamp when viewed at some off-axial angle.

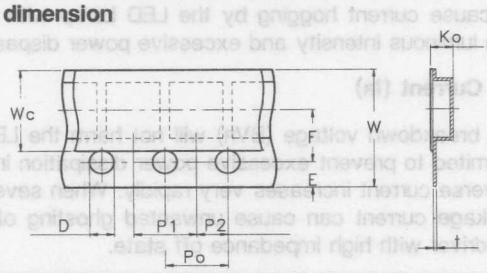
Packing information

The Liton's SMT component are packaged in tape and reel per ANSI/EIA standard 481-1-A

Embossed carrier useing list

Series no.	Carrier type
LTL-93B GULL WING	8mm
LTL-93B Z-BEND	12mm
LTL-93B YOKE	12mm
LTL-94P SERIES	8mm
LTL-94T SERIES	8mm
LTST-C170 SERIES	8mm

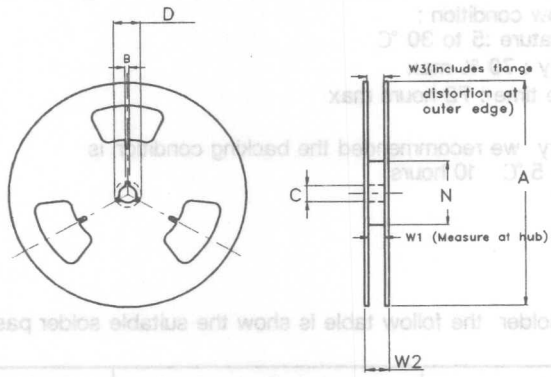
Embossed carrier tape dimension



Symbol	8mm tape	12mm tape
D	1.6(0.063)DIA	1.6(0.063)DIA
E	1.75(0.069)	1.75(0.069)
F	3.51(0.138)	5.12(0.202)
Po	4.00(0.157)	4.00(0.157)
P1	4.00(0.157)	4.00(0.157)
P2	2.00(0.079)	2.00(0.079)
Wc	5.5(0.216)	9.3(0.366)
W	8.00(0.315)	12.00(0.490)
t	0.2(0.008)	0.3(0.012)

SMD LED Lamp application notes

Reel dimension



Tape size	A	B min	C	D min	N min	W1	W2	W3min/max
8mm	178	1.5	13	20.0	50	8.4	14.4	7.9/10.9
12mm	178	1.5	13	20.2	50	12.4	18.4	11.9/15.4

All dimensions are in mm

Packing label

TAIWAN LITON ELECTRONIC CO.,LTD.

90, CHIEN 1 ROAD, CHUNG HO CITY
TAIPEI, TAIWAN, R.O.C.

CUSTOMER:
DEVICE TYPE:
BIN:
COLOR RANK:
LOT NO:
QUANTITY:

Packing Quantity

Series No.	Quantity
LTL-93B GULL WING	1500/5000
LTL-93B Z-BEND	1500/5000
LTL-93B YOKE	1500/5000
LTL-94P SERIES	1500/5000
LTL-94T SERIES	1500/5000
LTST-C170 SERIES	3000

Damp-proof packing

The aluminum laminate bag with a high damp-proofing effect is use as the package material The outer

SMD LED Lamp application notes

surface of the bag is given an anti-static finish. After open the aluminum laminate bag the lamps should be storage in the follow condition :

temperature :5 to 30 ℃
humidity : 70 % max
storage time : 72 hours max

Backing condition

If backing is necessary we recommended the backing condition is

60 +/- 5 ℃ 10 hours

Soldering Note

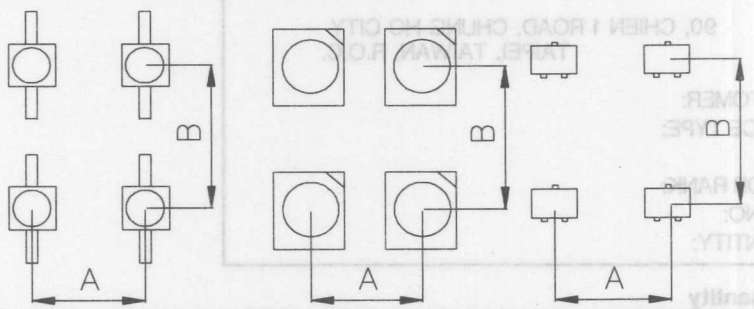
Solder Paste

In order to get good solder the follow table is show the suitable solder paste for each component

Series No.	Lead surface matel	Solder paste contain
LTL-93B SERIES	Silver plating	62%Sn/36%Pb/2%Ag
LTL-94P SERIES	90%Sn/10%Pb solder plating	63%Sn/37%Pb
LTL-94T SERIES	90%Sn/10%Pb solder plating	63%Sn/37%Pb
LTST-C170 SERIES	Au plating	63%Sn/37%Pb

Spacing

The following table is show the minimum spacing of components



Series No.	Side to side (a)	End to end (b)
LTL-93B GULL WING	3.0/0.118	6.0/0.236
LTL-93B Z-BEND	3.0/0.118	8.15/0.321
LTL-93B YOKE	3.0/0.118	9.4/0.370
LTL-94P SERIES	3.0/0.118	6.0/0.236
LTL-94T SERIES	3.0/0.118	6.0/0.236
LTST-C170 SERIES	3.0/0.118	6.0/0.236

Convective IR Reflow Soldering

The fig 1 is show the typical condition of convective IR reflow and see Table I for △ Temperature value.

SMD LED Lamp application notes

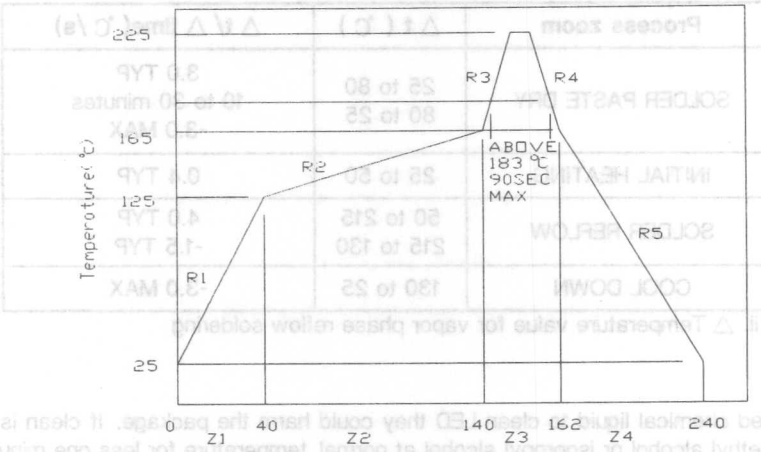


Fig 1. Convective IR Reflow

Symbol	Process zoom	△ t (℃)	△ t/ △ time(℃ /s)
Z1,R1	HEAT UP	25 to 125	3.0 MAX
Z2/R2	SOLDER PASTE DRY	125 to 165	0.5 MAX
Z3/R3 /R4	SOLDER REFOLW	165 to 225 225 to 165	4.5 TYP -4.5 TYP
Z4/R5	COOL DOWN	170 to 25	-3.0 MAX

Table I. △ Temperature value for Convective IR Reflow

Vapor Phase Reflow Soldering

the Fig 2 is show the typical condition of vapor phase reflow soldering and Table ii for △ Temperature value.

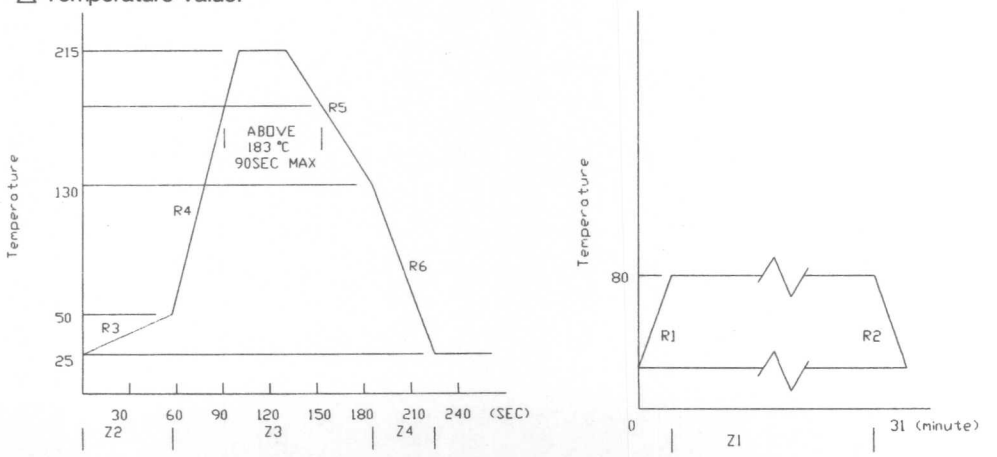


Fig 2. Vapor Phase Reflow Soldering

APPLICATION NOTES

SMD LED Lamp application notes

Symbol	Process zoom	△ t (℃)	△ t/ △ time(℃ /s)
Z1/R1 /R2	SOLDER PASTE DRY	25 to 80 80 to 25	3.0 TYP 10 to 30 minutes -3.0 MAX
Z2/R3	INITIAL HEATING	25 to 50	0.4 TYP
Z3/R4 /R5	SOLDER REFLOW	50 to 215 215 to 130	4.0 TYP -1.5 TYP
Z4/R6	COOL DOWN	130 to 25	-3.0 MAX

Table ii. △ Temperature value for vapor phase reflow soldering

Cleaning

Do not use unspecified chemical liquid to clean LED they could harm the package. If clean is necessary ,immerse the LED in ethyl alcohol or isopropyl alcohol at normal temperature for less one minute.

Digital circuit interface for Optical Switch

In most of application cases, Optical Switch acts as a sensor or switch in the system; To be a Input for ASIC or Micro Processor in an electrical equipment with intelligent function. Following figure provide a typical circuits for Optical Switch to interface with the ASIC and Micro Processor . (Please refer the product data for specifications on the individual part number for the Ic(on) light current value.)

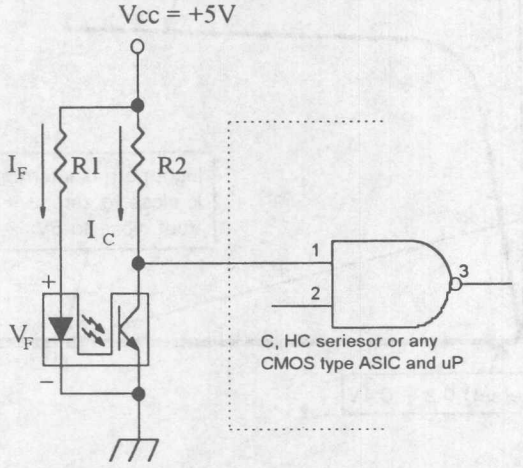


Fig. 1 CMOS series interface circuit

Example calculation for Fig. 1 :

Here choice LTH-301-19 for an example. In most of actual case the outside dimensions is first parameter to be considered to fit the application requirement and the second is Ic(on) light current value. Here break down the calculation into few steps to demonstrate the way to choice suitable R1 and R2 value for the Optical switch with specificed Ic(on) value.

According the specifications of LTH-301-19.
The Ic(on) min is 1.5mA at I_F = 20mA, Vce = 5V

I_F = (Vcc - V_F) / R1
= (5V - 1.2V) / R1 ---------- (V_F is close to 1.2V at I_F from 10mA to 20mA)

Suggest I_F = 10mA then R1 = (5V - 1.2V) / 10mA, R1 = 380 Ohms

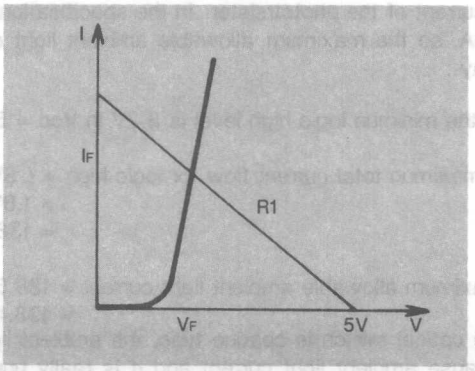


Fig. 2 Forward I-V characteristics of the IR LED

APPLICATION NOTES

Digital circuit interface for Optical Switch

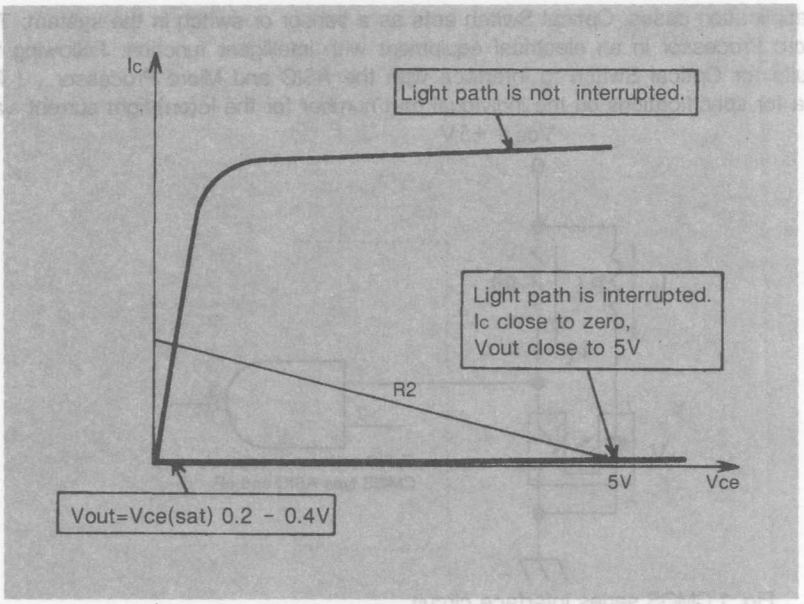


Fig. 3 Phototransister in common-emitter bias

Ic(on)min = 1.5mA at IF = 20mA, Vce = 5V,
Ic(on)min close to 0.75mA when IF =10mA
(The Input low current and Input high current of CMOS gate are very low and could be neglected)

Then R2(min) = 5V / 0.75mA = 6.7K ohms

When the target object (the object to be detected) does not interrupt the light path (the slot of the optical switch) then phototransister turn on. Consider to make Phototransister into deep saturated area to get a good logic low level and reserve necesssary guard band for whole circuit, the suitable R2 is 2 times of R2(min), so the suitable R2 in above application circuit for LTH-301-19 is 13K. When the target object interrupts the light path, the curent flow in the loop is caused by the two possible reasons, Ambient light and Iceo leakage current of the phototrsister. In the specifications, the leakage current of phototransister is less than 100nA, so the maximum allowable ambient light current in above example could be checked by following way :

1. Assuming the minimun logic high level is 3.2V in Vcc = 5V.

2. Then the maximun total current flow for logic high = (5V - 3.2V) / 13K Ohms
   = 1.8V / 13K Ohms
   = 138.5uA

3. So the maximum allowable ambient light current = 138.5uA - 0.1uA
   = 138.4uA

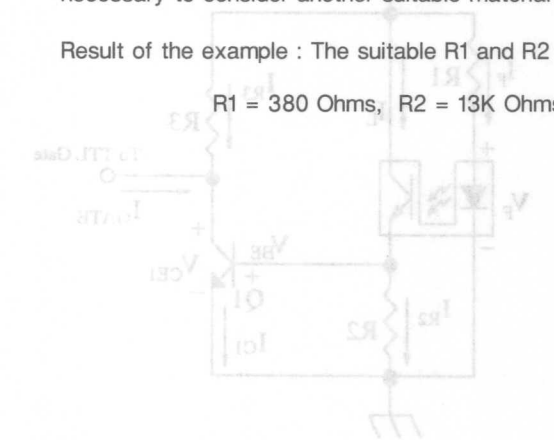
Because the housing of the optical switch is opaque type, the ambient light only can vie the slit in front of the phototransister to cause ambient light current and it is really unusual to get such high ambient light current in a normal application condition. The object to be detected can not cut the light from the emitter completely is the another possible reason to make unexpected current flow in the phototransister

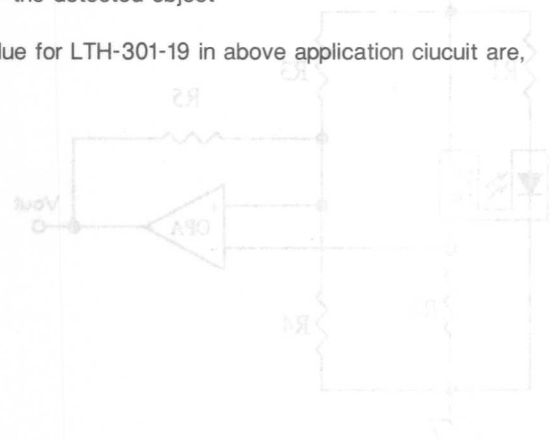
Digital circuit interface for Optical Switch

when the objet interrupts the slot. Due to this reason there is partial light pass through the object and cause unexpect current in the phototransister and if it is high enough to make wrong logic level then it is necessary to consider another suitable material for the detected object

Result of the example : The suitable R1 and R2 value for LTH-301-19 in above application ciucuit are,

R1 = 380 Ohms, R2 = 13K Ohms





Optical Switch application circuit collection

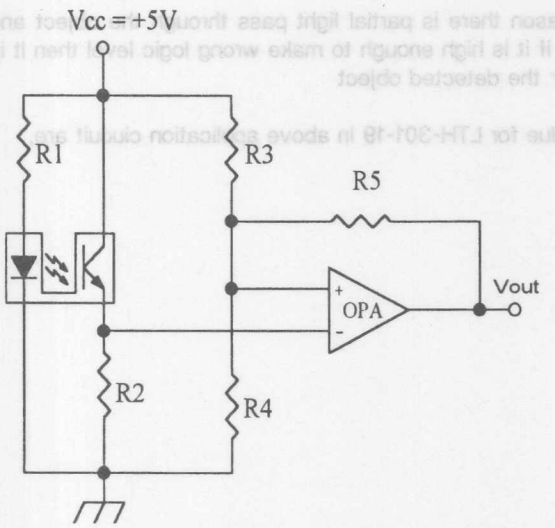


Fig.3 Circuit with voltage comparator

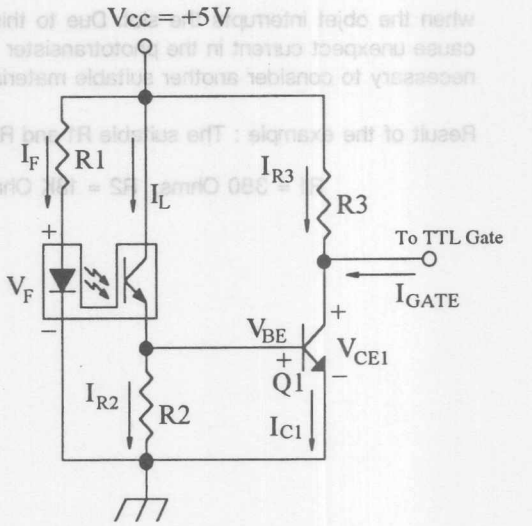


Fig.4 Circuit with a additional transistor

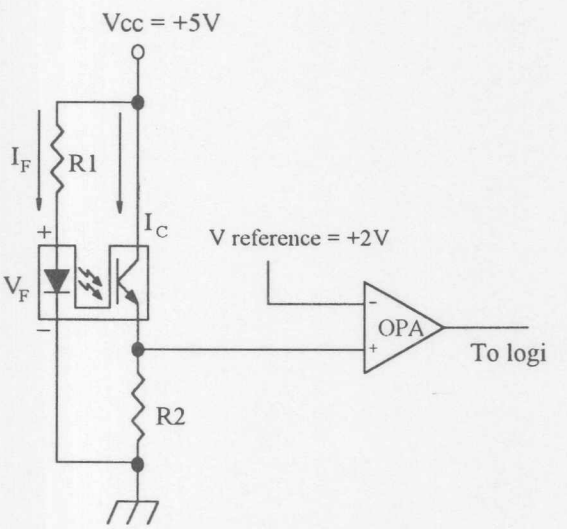


Fig.5 Circuit with operation amplifier

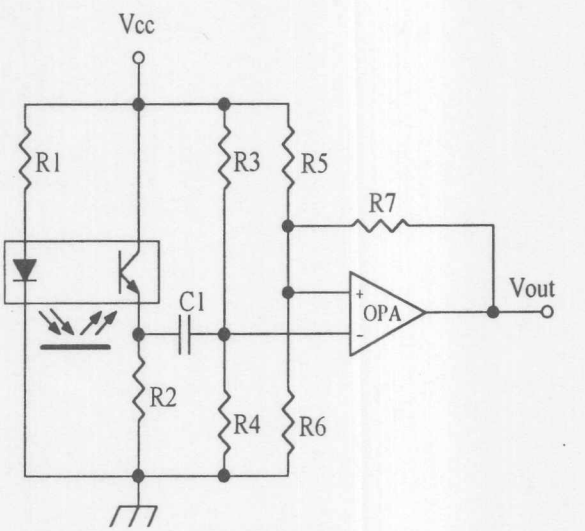


Fig.6 Circuit with OPA AC coupling

Optical Switch application circuit collection

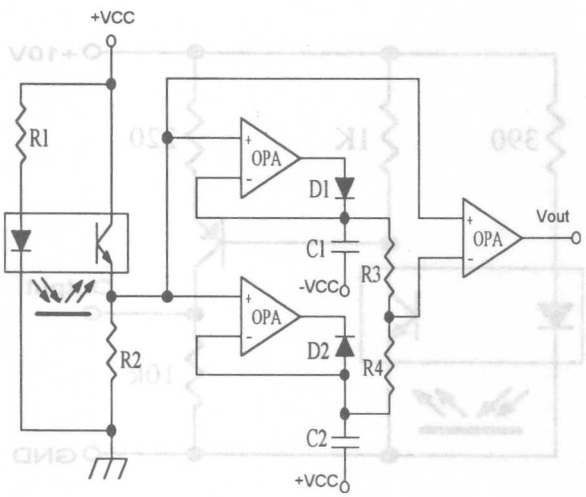


Fig.7 Circuit with floating comparator

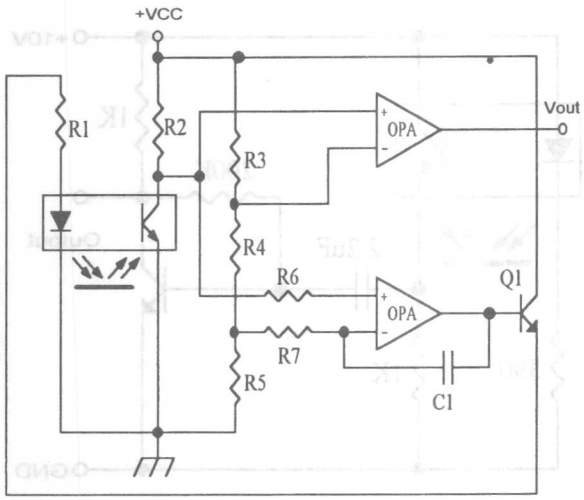


Fig.8 Circuit with emitting light compensation

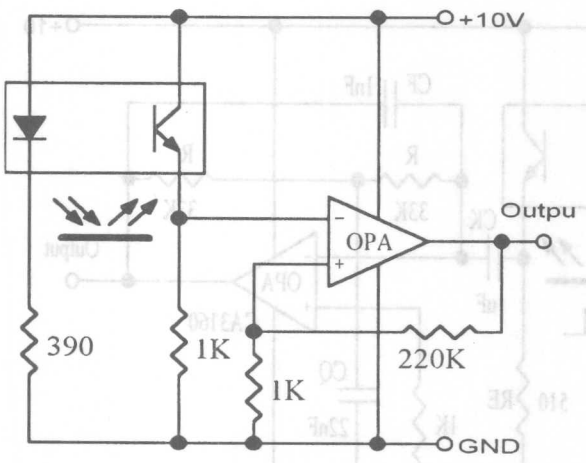


Fig.9 Circuit with operation amplifier

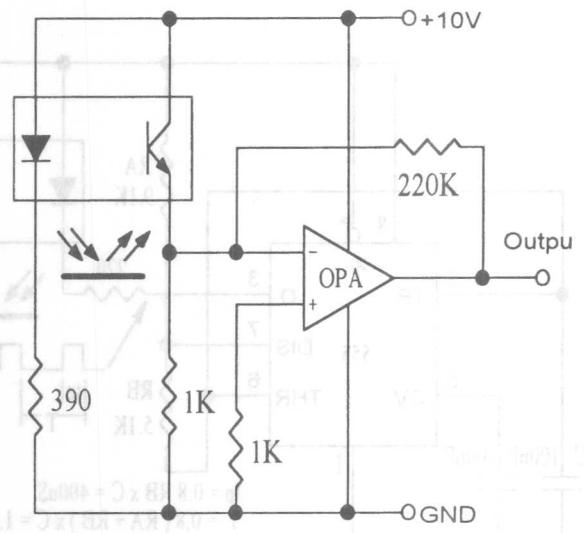


Fig.10 Circuit with operation amplifier

APPLICATION NOTES

Optical Switch application circuit collection

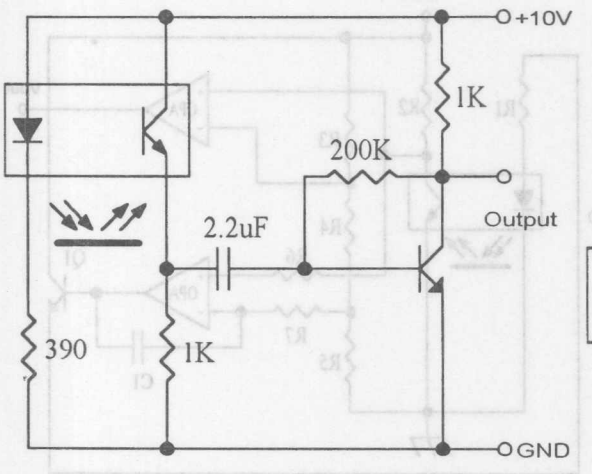


Fig. 11 Circuit with transistor amplifier

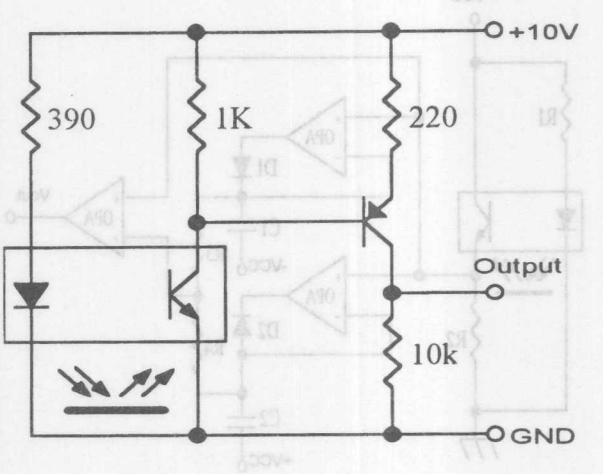


Fig.12 Circuit with transistor amplifier

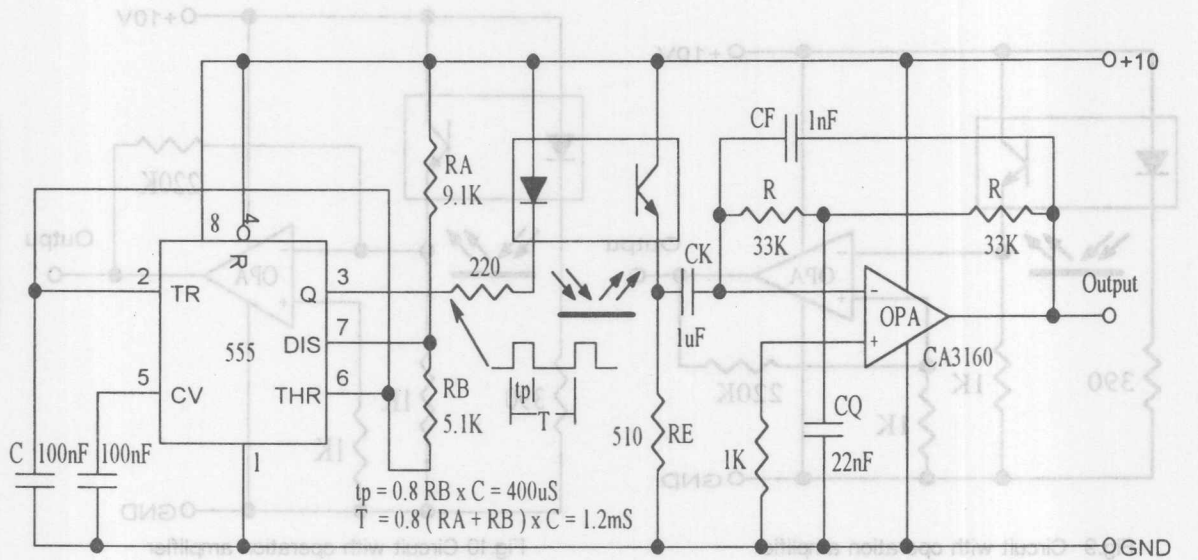


Fig.13 Circuit with AC coupling and oscillating to suppress the ambient light

Optical Switch application circuit collection

Fig. 2 shows a typical circuits with TTL logic gate, when use a standard TTL gate the input current IIL and IIH of the standard type TTL gate is relative high and may impact the output voltage level of optical switch, it may be necessary to add a additional transistor or OPA to increase the output capability of the optical switch especial for the low Ic(on) type of optical switch.

Fig. 3 shows a circuit with voltage comparator when a precise trigger level is required, the trigger level also can be adjustable by a trimmport to fit various sensitivity optical switches in the same system.

Fig. 4 shows a circuit with a additional transistor as amplifier to increase the detecting sensitivity or keep same sensitivity but reduce the emitter drive current to save power and increase the life of the sensor or increase the output drive capability, an operation amplifier also can be used to reach same purpose, especially for the reflective type , the active signal Ic(on) of reflective type optical switches is relative small, in most of cases it may only few uA, so an additional amplifier is necessary to be added at the output of the sensor , for example the circuits of Fig. 5, 9, 10, 11 and Fig. 12.

In some applications, the environment condition such as high ambient light and optical switch be operated in a open frame space, they may make low S/N (signal / noise ratio) to optical switches, for these cases an AC signal processing circuit is necessary to eliminate the noise, increase the S/N ratio and make the system more reliable.

Fig. 6 is a AC coupling circuit with fixed trigger level, Fig. 7 shows the circut with floating comparison level,

Fig. 8 is an example circuit with auto light level compensation for emitter to keep the light output level of emitter in constant.

Fig. 13 is a simple example to operate the reflective type optical switches with chopped light (modulation), it uses a pulse generator constructed with a timer IC and a operation amplifier as a band pass filter for the purpose to suppress the ambient light and increase the S/N ratio.

Use IRED and IR Receiver Module to build an Infrared remote control function

Fig.1 shows a typical Infrared remote control system, the system includes a Transmitter Set and the Receiver. The Receiver is located in front of the end product such as a TV Set, Air Conditioner, Hi-Fi equipment or any other electrical equipment with Infrared remote control function.

The Transmitter Set consists of batteries for power supply; most of they are 3V, two 1.5V AAA type in serial, very few percentage use 9V battery as power supply, a set of keypad for function and commend input which be pressed by human's finger, a Coder IC formats the signals (data) for each specified keypad, one or two IREDs to be the transducer to convert electrical signals to infrared light and the Tr and R to boost Coder IC signal and drive IRED with specified current.
The receiver side consists of an IR Receiver Module which converts Infrared light to electrical signal and output TTL logic / 5V CMOS logic serial data to Decoder IC, the Decoder IC has same communication protocol with Coder IC to identifies the serial data of each specified keypad send from Transmitter Set then output specified control signal to control the end product.

The remote control system designer can buy the existing Coder and Decoder ICs from the market, the most of Semiconductor makers provide remote control purpose Coder and Decoder ICs as the standard product. The designers also can use single chip microprocessor / uP to perform their own Coder and Decoder IC for their own unique system.

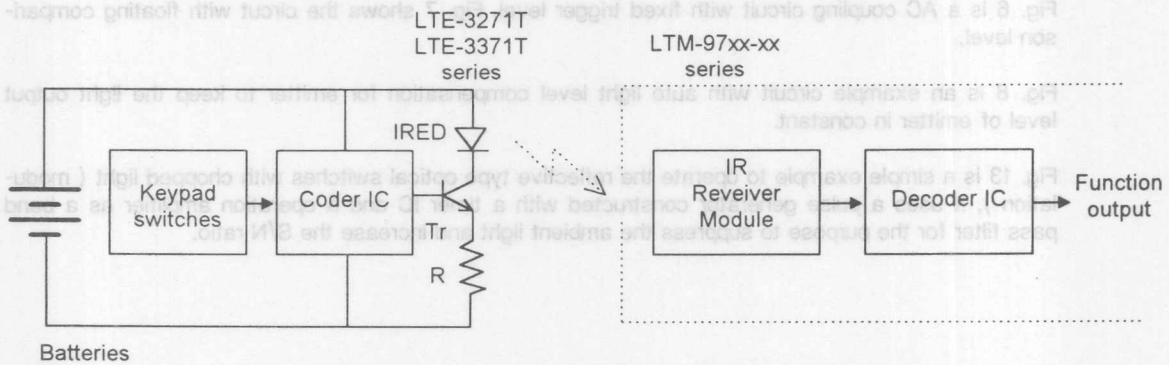


Fig. 1 A typical Infrared remote control system

For the reason to increase Signal / Noise ratio and enhance arrival distance, the most of IR remote control system in the field is belog to Carrier Mode; the data send by Transmitter Set is modulated with a carrier frequency and the Receiver has a band pass filter with same center frequency to match Transmitter Set. The function of band pass filter is builded inside of the IR Receiver Moduler, the user don't have to take time to perform this function by themself, all they have to do just choice a desired frequency. The available frequencys in the market at this moment are 33K, 36K, 38K, 40K and 56KHz.

Use IRED and IR Receiver Module to build an Infrared remote control function

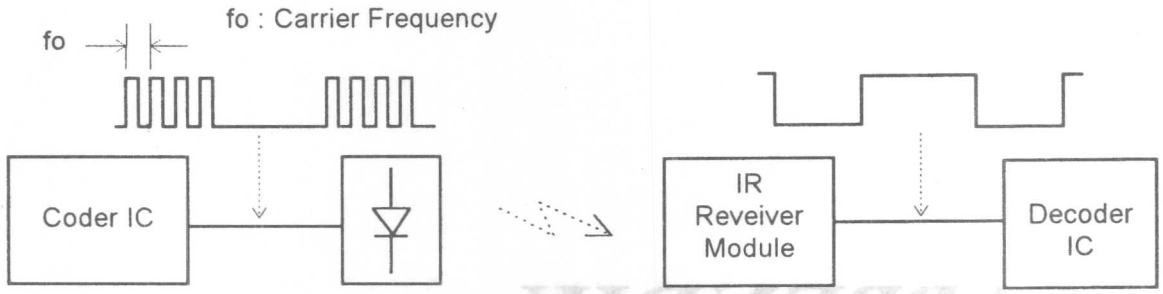


Fig. 2 Active low output type IR Receiver Module

Figure 2 shows the output of Carrier Mode IR Receiver Module is active low type, this format is suitable for the existing Coder and Decoder ICs in market. Designer should consider this format when use a single chip microprocessor or ASIC to perform coder and decoder function. Due the AGC / Automatic Gain Control function of the IR Receiver Module, the pulse width of the first Bit will be extended, this point also have to be considered for the Coder and Decoder IC designers.
The arrival distance of a typical system in a regular condition is about 6 to 20 meters, it is decided by following three matters :

1. The drive current to the IRED, the power output of IRED and the batteries' condition.
2. The performance of IR Receiver Module and the environment noise level, the noise includes the EMI, ambient light and the ripple of the power supply to the IR Receiver Module.
3. The data format and Coder / Decoder IC performance.

To choice a suitable IRED for remote control Transmitter set, there are three key parameters of IRED should be considered which can decide the performance of IRED in the system; Forward I-V characteristics, Forward current vs total radiant flux characteristics and the light distribution. Liton LTE-3271T, LTE-3371T high performance infrared emitting diode featuring 940nm peak wavelength, T-1 3/4 (O 5 mm) plastic lens which designed and optimized with above three parameters specifically for remote control and the applications where need low forward voltage, high power, high efficiency and wide viewing angle characteristics.

The power supply of the transmitter set is 3V usually, in the current loop of IRED, Tr and R with such low supply voltage, the current flow is not only decided by R and forward I-V characteristics of IRED but the Vce(sat) of drive Tr also is a major factor to limit the peak current to the IRED. It is necessary to choice a low Vce(sat) type of drive transistor (Tr) when a high drive current is required.

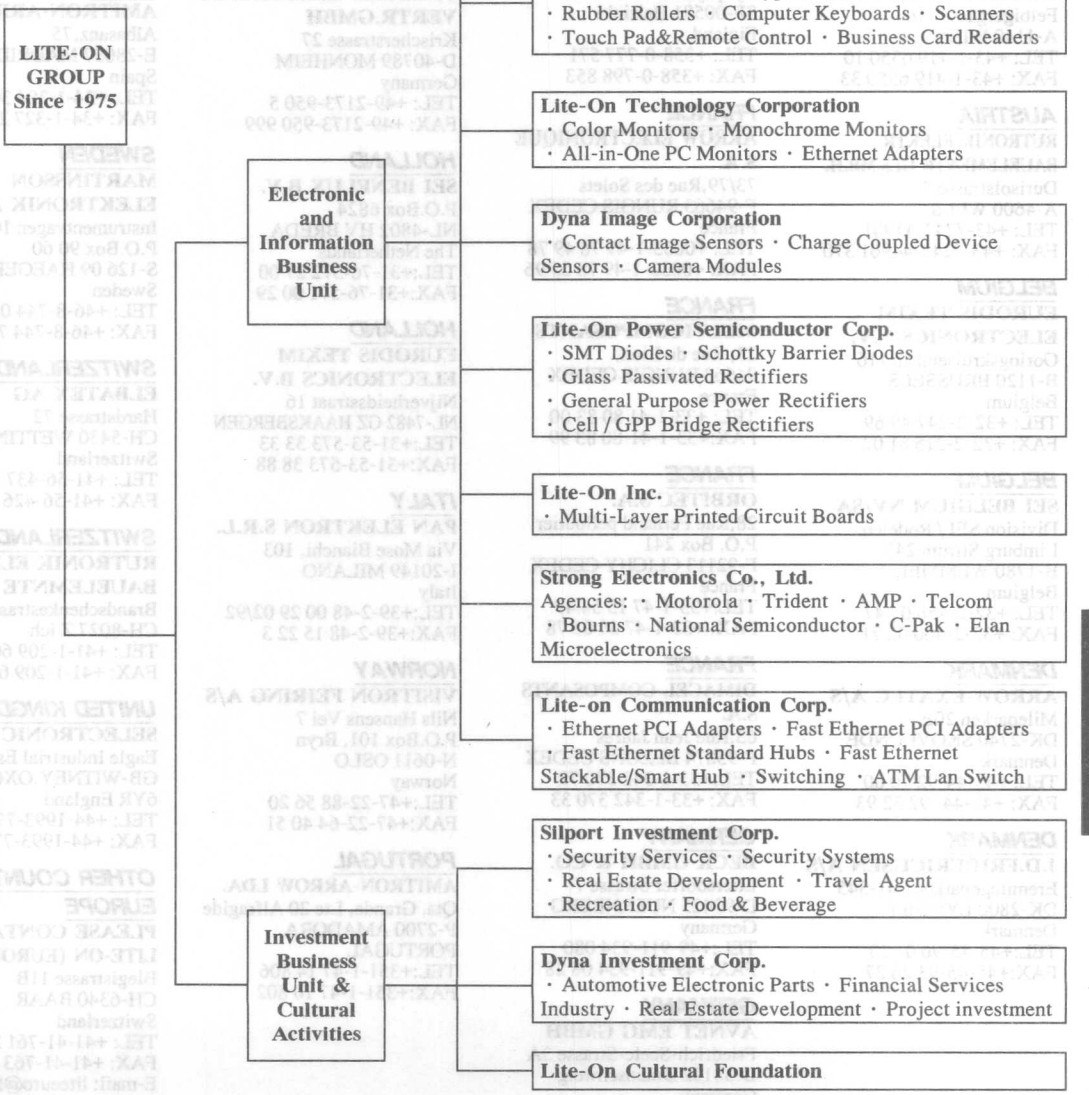
Inside of the IR Receiver Module, a PIN photodiode with IR filter, the filter can reduces the ambient light for PIN photodiode and it can increase the S/N ration and performance to the remote control function.
Liton LTM-97xx-xx series IR Receiver Module also featuring a metal can package to be a shield to minimize the EMI from the operated environment.

APPENDIX

- GROUP ORGANIZATION & STRUCTURE ····· 19-1
- DISTRIBUTORS AND REPRESENTATIVES IN THE WORLD ····· 19-2

Group Organization & Structure

The Lite-On Group is organized into two units,Electronic & Information Business Unit and Investment Business Unit & Cultural Activities. The following chart shows how the Group is organized, as well as major products and areas of Business.



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